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# Final Program

## The 2011 International Neuropsychological Society Mid-Year Meeting/ASSBI 4th Pacific Rim Conference

July 6-9, 2011  
Auckland, New Zealand

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### WEDNESDAY, JULY 6, 2011

- 9:00 AM–12:00 PM **CE Workshop 1: Helping People Without Making Them Helpless: Supporting Individuals with Brain Injury to Develop Self-Regulation**  
Speaker: Tim Feeny  
*New Zealand Room 3*
- 9:00 AM–12:00 PM **CE Workshop 2: Understanding Mechanisms of Attention in Health and Disease**  
Speaker: Jason Mattingley  
*New Zealand Room 4*
- 12:00–1:00 PM **Wednesday Lunch (on your own)**
- 1:00–4:00 PM **CE Workshop 3: New Directions in the Assessment of Frontotemporal Dementia**  
Speaker: John Hodges  
*New Zealand Room 3*
- 1:00–4:00 PM **CE Workshop 4: Development Social Neuroscience: Contributions to Understanding Social Impairment After Early Brain Injury**  
Speaker: Vicki Anderson  
*New Zealand Room 4*
- 5:45–6:30 PM **Maori Powhiri**  
*New Zealand Room 1*
- 6:30–8:30 PM **Maurice Blackburn Welcome Reception**  
*New Zealand Room 1*

### THURSDAY, JULY 7, 2011

- 7:00–9:00 AM **CE Workshop 5: The Value of Single-Case Participant Designs (and N-Of-1 Trials) for Treating Patients with Acquired Brain Impairment in Clinical and Research Settings**  
Speakers: Robyn Tate, Kali Godbee  
*New Zealand Room 2*
- 9:00–9:15 AM **Welcome Address**  
*New Zealand Rooms 3 & 4*
- 9:00 AM–5:00 PM **Poster Session 1 (posters are available from 9am-5pm, however, authors will be presenting during morning tea, lunch break and afternoon tea)**  
*New Zealand Room 1*
- Aging**  
HERITABILITY OF EPISODIC MEMORY IN ELDERLY TWINS
1. LAMMEL, A  
2. YOSHIZAKI, K  
Age-related impairment of modulation in visual selectivity depending on conflict frequency
- Assessment/Psychometrics/Methods (Adult)**  
Do the Self-reported and the Objective Forms of Prospective Memory Measures Assess the Congruous Psychological Construct?
3. HSU, Y  
4. KRAAN, CM  
The Cognitive Constructs Underlying Verbal Fluency Performance Vary According to Test Type and Lifespan

5. REMINGER, SL  
**Cancer**  
The Relationship Between Mood Symptoms and Neuropsychological Function in Breast Cancer Survivors
6. LAMB, YN  
**Cognitive Neuroscience**  
Influence of Brain-Derived Neurotrophic Factor (BDNF) and Catechol-O-Methyltransferase (COMT) Polymorphisms on Recall and Recognition
7. MARTIN, VC  
Prior Construction of Imagined Events Affects Degree of Core Autobiographical Network Activation
8. MATUTE, E  
The Influence of Educational Levels on the Performance of an Antisaccadic Eye Movement Task
9. ~~MORADY, K~~  
~~Eye movements in action disorganisation syndrome: A single case analysis~~
10. ~~MORADY, K~~  
~~Automatic Guidance of Auditory Attention from Working Memory~~
11. SIMON, JJ  
Generating options for action: cognitive and neural correlates
12. ZHAVORONKOVA, L  
Peculiarities of dual task performance in healthy persons (postural control and calculation)
13. CRAWFORD, S  
**Dementia**  
A Systematic Review of the Accuracy and Clinical Utility of the Addenbrooke's Cognitive Examination and the Addenbrooke's Cognitive Examination – Revised in the Diagnosis of Dementia
14. CRAWFORD, S  
An Investigation of Rater Reliability of the Addenbrooke's Cognitive Examination – Revised (ACE-R)
15. HELMES, E  
Cognitive Screening of Older Adults: The Utility of Pentagon Drawing
16. KIRK, A  
Neither Day Length Nor Outdoor Temperature Extremes Affect Cognitive Performance In Rural And Remote Memory Clinic Patients
17. O'CALLAGHAN, C  
A Convergent Approach Towards Disinhibition in Frontotemporal Dementia
18. RICCI, M  
Rey Auditory Verbal Learning Test (RAVLT): a useful tool for differentiating Alzheimer's Dementia from behavioral variant Fronto-Temporal Dementia
19. WEINBORN, M  
**Drug/Toxin-Related Disorders (Including Alcoholism)**  
Prospective Memory Ability Amongst Ecstasy and Heavy-Alcohol Using Young Adults
20. RYMARCYK, K  
**Emotional Processes**  
Sex Differences in Facial Imitation- EMG Study
21. STARKEY, NJ  
**Executive Functions/Frontal Lobes**  
The Relationship Between Neuropsychological Functioning and On-Road Driving Behaviour in Young, Novice Drivers
22. BADZAKOVA-TRAJKOV, G  
**Hemispheric Asymmetry/Laterality/Callosal Studies**  
Magical Ideation, Creativity, Handedness, and Cerebral Asymmetries: a Combined Behavioural and fMRI Study
23. HARMS, V  
Lateralization of Melodic Processing after Hemispherectomy Compared to Neurologically Normal Participants
24. HAUGRUD, N  
Examining Laterality in Verbal Fluency Performance 40 Years Following Left or Right Hemispherectomy
25. ITOI, C  
Individual variations of cerebral dominance: language and emotional functions might be coexisting in same hemisphere
26. IWABUCHI, S  
Distinctly Lateralised Networks for Verbal and Spatial Working Memory
27. SIFFREDI, V  
Neuropsychological Profile of Agenesis of the Corpus Callosum – A Systematic Review
28. ENNOK, M  
**HIV/AIDS/Infectious Disease**  
Neuropsychological Features in Advanced Dementia due to Neurosyphilis: A Case Report
29. FOGG, LA  
**Language and Speech Functions/Aphasia**  
Community Choirs for People with Brain Disease: Social Singing or Potential Therapy?
30. MONTEIRO, F  
Executive functions in aphasic patients: a preliminary study
31. OFEK, E  
Neural Processing of Emotional Words in Aphasia Using EEG and Related Therapy
32. ~~MIYAHARA, M~~  
~~From Gestures to Words: Verbal labelling of hand movements reduces activation of the inferior frontal gyrus~~
33. SZATKOWSKA, I  
Neural Bases of Executive Dysfunction in Parkinson's Disease: Identifying Brain Areas Involved in Minimally Sufficient and Rate-Limiting Processes Using Functional Magnetic Resonance Imaging
34. VAN MULUKOM, V  
Hippocampal and Amygdalar Connectivity During Simulation of Novel Future Events
35. FERNÁNDEZ-GUINEA, S  
**MCI**  
RECOVERY VERSUS RECOGNITION IN AGING, MILD COGNITIVE DETERIORATION AND ALZHEIMER'S DISEASE
36. BULL, PN  
**Memory Functions**  
Type of Recognition Test May Influence the Relative Contributions of Familiarity and Recollection When Recognizing Emotional Visual Images
37. EVANS, JJ  
Oops, It Slipped My Mind: Improving the Assessment of Prospective Memory Using Two-Phase Computerised Tasks
38. HATTA, T  
Handedness difference in direction memory: A neuropsychological model
39. MATSUI, M  
Selection of memory strategy and brain activity during metamemory process : a near-infrared spectroscopy study
40. MCCORMICK, KA  
The Influence of Visual/Verbal Abilities and List Concreteness on Susceptibility to False Memories
41. SCHEIBNER, GB  
Everyday Forgetfulness and Memory Strategy Use: The Effects of Memory Goal Importance
42. VEARNCOMBE, KJ  
The Impact of Anxiety vs. Memory Impairment on the Assessment of Financial Capacity: Two Case Studies
43. NAGAI, C  
**Medical/Neurological Disorders/Other (Child)**  
Closing-in phenomenon during line-by-line figure copying in Williams syndrome
44. HO, M  
**Medical/Neurological Disorders/Other (Adult)**  
The Neuropsychological Performance of Unilateral Carotid Artery Stenosis: A Preliminary Study
45. LOWNDES, G  
Financial Elder Abuse and Enduring Powers of Attorney - What Clinical Neuropsychologists should know
46. LOWNDES, G  
Priming effects during paired associate learning could lead to overestimation of recognition memory
47. ORLOWSKA, EI  
Broken bonds in aphasic couples
48. WITKOWSKA, MA  
Prospective Memory Impairment in Chronic Pulmonary Diseases
49. BIECHOWSKA, DH  
**Stroke/Aneurysm**  
Inhibitory control dysfunction in stroke patients
50. FERRY, K  
Community Rehabilitation Program - One Man's Journey

51. FERRY, K Community Rehabilitation Program - A Multidisciplinary Model of Care for Community Based Rehabilitation  
 52. MORRISS, E Behavioural and Personality Change Following Stroke: Developing Guidelines for Stroke Management  
 53. VYKOPAL, H The Long-Term (5-Year) Outcomes of Primary Intracerebral Haemorrhage. A Population-Based Study  
**Visuospatial Functions/Neglect/Agnosia**  
 54. GRABOWSKA, A Prioritizing visual information by emotion: fMRI study of hemispatial neglect  
 55. INOUE, J Relations between the compression ratio of the line bisection test and unilateral spatial neglect during activities of daily living performance  
 56. LOETSCHER, T Neglect of Early Relative to Late Events after Right-Hemisphere Damage  
 57. FOSTER, A Integrated Rehabilitation for Traumatic Brain Injury in New Zealand: Clinical Services and Client Data  
 58. WHITENECK, G The United States Traumatic Brain Injury Model Systems

9:15–10:15 AM

**International Keynote Address: Neuroimaging, Neural Connectivity and Neuropsychology****Speaker: Erin Bigler*****New Zealand Rooms 3 & 4***

1. BIGLER, ED Neuroimaging, neural connectivity and neuropsychology

10:15–10:45 AM

**Thursday Morning Tea and Poster Session 1 Presentations*****Level 5 Promenade***

10:45 AM–12:15 PM

**Session 2: Psychological and Cognitive Sequelae of Acquired Brain Injury*****New Zealand Room 2***

1. KANGAS, M Are Family Carers as Stressed as Patients with a Primary Brain Tumor? An Investigation of Carer and Patients' Psychosocial Adjustment Pre and Post-Radiotherapy  
 2. STRAITS-TROSTER, K An Adaptation of Multi-Family Group Treatment to Support U.S. Veteran TBI Survivors and their Families  
 3. HODGSON, K A Meta-Analysis of the Effect of Chemotherapy on Cognition in Patients with Cancer  
 4. BAIRD, A Social Factors in Focal Retrograde Amnesia  
 5. BARKER-COLLO, SL Cognitive and functional outcomes 5-years post-stroke: Examination of a large population-based sample  
 6. ENNOK, M Cognitive Profile of Patients with Manganese-Ephedrone Related Encephalopathy

10:45 AM–12:15 PM

**Session 3: Paediatric Traumatic Brain Injury*****New Zealand Room 3***

1. PAPOUTSIS, J Support for the Early Vulnerability Hypothesis: Mild TBI Sustained in Early Childhood is Associated with Ongoing Sequelae  
 2. ROSEMA, S Social functioning in children and adolescents after brain injury: a systematic review  
 3. FRITH, MH Assessment of children with communication difficulties after TBI: Is the practice of SLPs Evidence Based?  
 4. MEALINGS, M Considering the Student Perspective in Returning to School after TBI: a Literature Review  
 5. MCKINLAY, A Predicting adult offending behavior for individuals who experienced a Traumatic Brain Injury during childhood  
 6. BENSON, S Executive Function in Preschool Children after Early TBI: A Pilot Study

10:45 AM–12:15 PM

**Session 4: Parkinson's Disease And Other Dementias*****New Zealand Room 4***

1. TROSTER, AI Group and Individual Neuropsychological Outcomes After Bilateral Subthalamic Deep Brain Stimulation in Parkinson's Disease: A Delayed-Activation Arm Controlled, Randomized, Multicenter Study  
 2. BUXTON, S Impact of Parkinson's Disease on Social Relationships  
 3. IRISH, M Impaired Episodic Future Thinking in Frontotemporal Dementia - Evidence For a Compromised Default Network  
 4. KANE, R Functional Capacity in Parkinson's Disease: The Value Added of Assessing Cognition  
 5. CANNAN, P The Cognitive Profile in Parkinson's Disease

12:15–1:15 PM

**Thursday Lunch Break and Poster Session 1 Presentations*****Level 5 Promenade***

1:15–2:15 PM

**National Keynote Address: The Bright Tax: What Penalizes Higher Fluid Intelligence in Old Age?****Speaker: James Flynn*****New Zealand Rooms 3 & 4***

1. FLYNN, JR The Bright Tax: What Penalizes Higher Fluid Intelligence in Old Age?

2:15–3:15 PM

**INS Presidential Address: Whither (Wither?) Neuropsychology?****INS President: Rus Bauer*****New Zealand Rooms 3 & 4***

1. BAUER, R Presidential Address: Whither (Wither?) Neuropsychology?

3:15–3:45 PM

**Thursday Afternoon Tea and Poster Session 1 Presentations**  
*Level 5 Promenade*

3:45–5:15 PM

**Symposium: Understanding Social Functioning after Early Brain Insult**  
**Chair: Megan Spencer-Smith**  
*New Zealand Room 2*

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|---------------------|---|
| 1. SPENCER-SMITH, M | Understanding social functioning after early brain insult                             |
| 2. ANDERSON, VA     | Social functioning and early brain insult: is there an 'age at insult' effect         |
| 3. SPENCER-SMITH, M | Social functioning and attention in young people with agenesis of the corpus callosum |
| 4. MCILROY, A       | Social emotion processing in young people with agenesis of the corpus callosum        |
| 5. CROWE, L         | Social function outcomes following traumatic brain injury before 3 years of age       |
| 6. BEAUCHAMP, M     | Social outcomes in adolescents with TBI: multimodal approaches                        |

3:45–5:15 PM

**Session 7: Language and Communication**  
*New Zealand Room 3*

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|---------------------|---|
| 1. PATSTON, LL      | Background Music Decreases Performance of Language Comprehension in Musicians   |
| 2. KILOV, AM        | Chatting online- exploring chatroom interactions of adults with and without TBI   |
| 3. CASTRO-CALDAS, A | Action Verbal Fluency: Lexical Frequency and Level of Education   |
| 4. POWER, E         | Transferring a National Research Program into Action in Aphasia Rehabilitation. A Knowledge Transfer and Exchange Plan          |
| 5. TU, L            | Assessing Communication Ability Following Traumatic Brain Injury: The Benefits of Using Multiple Perspectives                   |
| 6. MEINZER, M       | Task difficulty dependent activity modulation in bilateral inferior frontal cortices in young and old age during word-retrieval |

3:45–5:15 PM

**Session 8: Dementia and Emotion**  
*New Zealand Room 4*

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|-----------------|--|
| 1. HSIEH, S     | Are You Happy? Knowledge Of Words That Describe Emotions In Frontotemporal Dementia                    |
| 2. TIPPETT, LJ  | Recognition of Facial Emotional Expressions in Presymptomatic Huntington's Disease: Mediation by Mood? |
| 3. PIGUET, O    | Emotion Processing in Nonfluent Primary Progressive Aphasias and Alzheimer's Disease                   |
| 4. FISHER, F    | Social Perception and Empathy in Huntington's Disease  |
| 5. SAVAGE, S    | Emotion Perception in MND and FTD  |
| 6. AL SALMAN, A | Validation of an Arabic Version of the Addenbrookes Cognitive Examination-Revised                      |

7:00–10:00 PM

**Conference Dinner at The Floating Pavilion (Optional additional fee required)**  
*The Floating Pavillion***FRIDAY, JULY 8, 2011**

7:00–9:00 AM

**CE Workshop 6: Practical Help for People with Memory Problems: Designing Memory Therapy Programmes for People with Non-Progressive Brain Injury**  
**Speaker: Barbara Wilson**  
*New Zealand Room 2*

9:00 AM–5:00 PM

**Poster Session 2 (posters are available from 9am-5pm, however, authors will be presenting during morning tea, lunch break and afternoon tea)**  
*New Zealand Room 1*

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| <b>ADHD/Attentional Functions</b>               |  |
| 1. DENSON, LA                                   | Psychological Treatments for Attention Deficit Hyperactivity Disorder (ADHD): A Meta-Analysis of Paediatric Outcome Studies  |
| 2. HALPERIN, JM                                 | Training Executive Attention and Motor Skills (TEAMS): A Novel Intervention for Preschoolers with ADHD   |
| <b>Assessment/Psychometrics/Methods (Child)</b> |  |
| 3. ROBERTS, RM                                  | What Effect Does Age Correction Have On IQ Scores Among School Age Children Born Prematurely?  |
| 4. <del>SCRATCH, S</del>                        | <del>Memory abilities in very preterm and very low birth weight children</del>   |
| <b>Autism Spectrum Disorders</b>                |  |
| 5. <del>FAUZAN, N</del>                         | <del>Neurofeedback Treatment for Attention and Behavioral Problems: A Case of Mild Autism</del>  |
| <b>Cognitive Intervention/Rehabilitation</b>    |  |
| 6. BACKHAUS, S                                  | Comparison of Cognitive-Behavioral Therapy and A Self-Directed Treatment Group on Self-Efficacy and Neurobehavioral Functioning in Brain Injury Survivors and their Caregivers |
| 7. BEST, CL                                     | Increasing Social Independence Through Client Centered Group Based Social Skills Therapy For Young Adults With An Acquired Brain Injury  |
| 8. DURHAM, CY                                   | The Learning Experience of People with Brain Injury  |

9. GARCIA SANCHEZ, O Prognostic factors in the effectiveness of neuropsychological rehabilitation programs
10. JANSARI, A The Cognitive Enhancement of Executive Functions by Nicotine: A Study Using Virtual Reality
11. MOHAN, N Examining the Nature of Resilience and Executive Functioning in People with Brain Injury and People with Multiple Sclerosis
12. SHIBASAKI, M Cognitive Rehabilitation for Activation Deficit in a Patient with Frontal Lobe Lesions: A NIRS Study
13. WELFRINGER, A Visuomotor imagery as a new tool in the rehabilitation of neglect: A randomized controlled study of feasibility and efficacy
14. KALDOJA, M **Epilepsy/Seizures**  
Social Skills and Social Cognition in Children with Newly Diagnosed Epilepsy
15. HOCKING, DR **Genetics/Genetic Disorders**  
Selective Spatial Processing Deficits in an at-risk Subgroup of the Fragile X Premutation
16. CRUZ RODRIGUES, C **Learning Disabilities/Academic Skills**  
Polysonographic Characteristics Of Children With Dyslexia
17. CRUZ RODRIGUES, C Neuropsychological Characteristics Of Children With Dyslexia
18. LEO, GS Educational Outcomes for Children with Moderate to Severe Acquired Brain Injury
19. OLLEY, A **Psychopathology/Neuropsychiatry (Other)**  
Evidence of Disrupted Decision Making in Obsessive Compulsive Disorder: A Neuropsychological Evaluation of the Cognitive Building Blocks of Decision Making
20. HUA, M **Psychopathology/Neuropsychiatry (Schizophrenia)**  
Verbatim and Gist Memory in Patients with Chronic Schizophrenia
21. HUA, M Are There Core Neurocognitive Deficits Specific to Patients with Schizophrenia
22. KIM, M An electrophysiological study of cognitive inhibition in college students with schizotypal traits
23. MATSUI, M Deficit in shifts of attention to different levels of global-local stimuli in patients with schizophrenia
24. BERG, N **TBI (Adult)**  
Better The Devil You Know: Challenges To Moving Younger People With ABI Out Of Nursing Homes
25. DRUMMOND, M Anosmia after Traumatic Brain Injury: Preliminary Findings of a Prospective Outcome Study
26. HASSETT, LM The Implementation of an Electronic Goals System and Staff Training can Increase the Quality of Goal Setting in a Community-Based Rehabilitation Setting
27. HO, H Goal Characteristics and Adjustment of One Patient with Complicated Mild Traumatic Brain Injury: A Preliminary Case Study
28. MATHIAS, JL Contribution of Biological and Cognitive Reserve to Outcome after Traumatic Brain Injury: A Meta-analytic Study
29. MCCLURE, J Brain Injury Through the Mind's Eye: Causal Attributions about Persons with Brain Injury
30. MIDORIKAWA, A Emergence of artistic ability after traumatic brain injury
31. PREECE, M Emergency Department Patients' Return-To-Driving Expectations Following Mild Traumatic Brain Injury
32. PRITCHETT, C Executive Function Impairment Following Traumatic Brain Injury: Do Female Sex Hormones Offer Protection?
33. REZNIK, JE Improved walking and reduced pain due to recurrent gross heterotopic ossification (HO), following treatment by extracorporeal shock wave therapy
34. SAINSBURY, SA Art Therapy in Cases of Acquired Brain Injury: Helping Participants Find Social Context Through Creative Self-Expression
35. STIRLING, C Gen Y: Traditional Rehabilitation Vs New Technologies – The Use of iPad as a Therapy Tool
36. THEADOM, A Effect of the Presence of Blood Alcohol at the Time of Injury on Health Outcomes Post-TBI
37. THOMAS, M The factor structure of the Quality of Life Inventory in a representative sample of adults with traumatic brain injury
38. YANG, C Evaluating irritability for patients with traumatic brain injury: A development of the National Taiwan University Irritability Scale
39. ~~YEE, Y~~ ~~Evaluation of an Early Multidisciplinary Group Intervention to Improve Psychosocial Outcomes following Acquired Brain Injury: A Case Study~~
40. YIM, J The Relationship Between Cognitive Functioning and Facial Affect Recognition Difficulties after Traumatic Brain Injury
41. ZHARIKOVA, A Dual task performance in patients with traumatic brain injury
42. BEADLE, E **TBI (Child)**  
Can children with an acquired brain injury improve their ability control their anger? Examining the effectiveness of a group cognitive behavioural therapy program with children with an acquired brain injury – a pilot study
43. CHARLTON, E The Impact of TBI Severity on Children's Health Related Quality of Life
44. ~~EREN, S~~ ~~Development of Experimental Measures of PTSD – Pilot in Healthy Children and Case Study Analysis In Children With and Without PTSD After TBI~~
45. OLSSON, K Impact of Post-Traumatic Stress and Injury Severity on the Recovery of Children's Health Related Quality of Life Following TBI
46. FOSTER, L Brain Injury and Socialisation: Do Visible Signs of Injury and Familiarity with Brain Injury Influence Peoples Willingness to Socialise?
47. HANCOCK, J Balance, Mobility and Community Participation Outcomes in a Cohort of Children with Acquired Brain Injury
48. KNUEPFER, C Reduced Semantic Priming Effects in two Females 40 years post Paediatric Closed Head Injury - a Preliminary Investigation
49. MURPHY, P Transition from Paediatric to Adult Brain Injury Services – A Survey of the Family's Experience
50. STARKEY, NJ The Incidence of Paediatric Traumatic Brain Injury in New Zealand: Preliminary Findings
51. THORNE, A Investigating Pretend Play Development in Pre-schoolers with an Acquired Brain Injury

**9:00–10:00 AM****National Keynote Address: Language, Time, and the Lopsided Brain****Speaker: Mike Corballis*****New Zealand Rooms 3 & 4***

1. CORBALLIS, M Language, time, and the lopsided brain

**10:00–10:30 AM****Friday Morning Tea and Poster Session 2 Presentations**  
*Level 5 Promenade***10:30 AM–12:00 PM****Session 10: Neurology and Psychiatry**  
*New Zealand Room 2*

1. BREWER, WJ
2. OLLEY, A
3. MEIER, SL
4. KLAAS, P
5. GIOGKARAKI, E
6. EVANS, JJ

Olfactory Predictors of Aggression in First-Episode Psychosis: Implications for Orbitofrontal Neural Compromise

Obsessive Compulsive Disorder: Failure to Inhibit or Failure to Decide?

Assessment of Orbital Prefrontal Cortex Using fMRI in Amyotrophic Lateral Sclerosis: A Case Study Approach

Mapping Cortical Responses in Epilepsy Patients Using MEG

Three profiles of cognitive dysfunction in different multiple sclerosis subtypes and clinically isolated syndromes

Accelerated Long-Term Forgetting in Temporal Lobe Epilepsy: Verbal, Non-Verbal and Autobiographical Memory

**10:30 AM–12:00 PM****Session 11: Methods and Measurements of Brain Injury**  
*New Zealand Room 3*

1. EGAN, C
2. PERDICES, M
3. TATE, R
4. JANSARI, A
5. ROBINSON, G
6. TUCK, DE

Management of Minimally Conscious Traumatic Brain Injured (TBI) Patients: Evaluation of the Western Neuro Sensory Stimulation Profile (WNSSP) as a Clinical Predictor for Rehabilitation Readiness

A simple regression model for predicting duration of post-traumatic amnesia (PTA)

Measuring Participation after Traumatic Brain Injury: Construct Validity and Clinical Utility of the Sydney Psychosocial Reintegration Scale

JAAM©: A Novel Ecologically-Valid Virtual Reality Assessment of Executive Functions

The Frontal Lobes, Strategy Use and the Hayling

Diagnostic Classification Systems and Personal Demographics are Poor Predictors of Cognitive Recovery following TBI

**10:30 AM–12:00 PM****Student Research Symposium**  
**Chair: Sommer Thorgusen**  
*New Zealand Room 4*

1. THORGUSEN, SR
2. LATHAM, AJ
3. WILSON-CHING, M
4. THOMPSON, CS
5. BROWN, JA
6. MITCHELL, C
7. WALLACE, KL

Student Research Symposium

Expert Video-Gamers Performing Line-Bisection Task Show Enhanced but Lateralised Visuospatial Attention

Varying academic outcomes in extremely preterm/extremely low birth weight adolescents are related to distinct profiles of attentional deficits

Brain-Derived Neurotrophic Factor val66met Polymorphism Influences The Magnitude Of Human Long-Term Potentiation Which Predicts Memory Performance

Neuropsychological Functioning and Illness Characteristics in Young Adults Who Have Bipolar Disorder with Childhood ADHD: A Comparison with Bipolar Disorder without Past ADHD, ADHD, and Control Groups

Coping with Communication Breakdown: A Comparison between Adults with Severe Traumatic Brain Injury and Healthy Controls

The Chinese Australian Neuropsychological Normative Study (CANNs) and Education Effects on The Rey-Osterrieth Complex Figure (ROCF) Test

**12:00–1:00 PM****Friday Lunch Break and Poster Session 2 Presentations**  
*Level 5 Promenade***1:00–2:30 PM****Session 13: Emotion Processing**  
*New Zealand Room 2*

1. MCDONALD, S
2. MILLON, G
3. ADLAM, AR
4. RUSHBY, J
5. MATHERSUL, D
6. KELLY, M

Impaired automatic processing of emotional faces following severe TBI: A backward masking paradigm

Does mirroring of emotions facilitate social understanding?

Empathy in Adult Survivors of Traumatic Brain Injury: The Role of Emotion Recognition and Interoception

Understanding Deficits in Empathy After Severe Traumatic Brain Injury

Understanding Complex Theory of Mind in Adults with Asperger's: Sarcasm versus Deception

Evidence for the Construct Validity of a Novel Social Decision Making Task

**1:00–2:30 PM****Session 14: Acquired Brain Injury Outcomes**  
*New Zealand Room 3*

1. SPITZ, G
2. WILLMOTT, CJ
3. PONSFORD, J
4. OWNSWORTH, T
5. MOUNCE, LT
6. RYLAND, HJ

Injury Severity, Coping, and Neuropsychological Functioning: The Relationship to White Matter Integrity Following Traumatic Brain Injury (TBI)

Effect of COMT Val/Met Genotype on Attention and Response to Methylphenidate Following Traumatic Brain Injury

The Relationship between Alcohol and Cognitive Functioning after Traumatic Brain Injury

Post-traumatic growth of individuals with acquired brain injury and their caregivers during community reintegration

The Neurological And Psychological Roots Of Post-Concussion Syndrome After MTBI: The Role Of Traumatic Re-Experiencing

Does Sports Concussion Have Long Term Neurocognitive Consequences?

1:00–2:30 PM

**Symposium: From Assessing to Managing Memory in Mild Cognitive Impairment: Current Issues in a Clinical Context****Chair: Glynda Kinsella***New Zealand Room 4*

1. KINSELLA, G
2. KINSELLA, GJ
3. PIKE, KE
4. HUTCHENS, R
5. RYBURN, B
6. LAMONT, A

From Assessing to Managing Memory in Mild Cognitive Impairment: Current Issues in a Clinical Context  
 Subjective Reporting of Memory Complaint in Mild Cognitive Impairment: Comparison of Self and Informant Report  
 The Utility of the WMS-IV Verbal Paired Associates in Discriminating Mild Cognitive Impairment from Healthy Aging  
 Knowledge and Use of Memory Strategies and Memory Performance in Amnesic Mild Cognitive Impairment Compared to Typical Aging  
 How Helpful are our Handouts? An Evaluation of Information Handouts for Clients with MCI and their Family Members  
 Age-Related Memory Loss: 20 to 95 years: A cross-sectional and longitudinal study of healthy, independent adults

2:30–3:00 PM

**Friday Afternoon Tea and Poster Session 2 Presentations***Level 5 Promenade*

3:00–4:00 PM

**ASSBI Presidential Address: Strategies to Improve the Communicative Interactions of People with Traumatic Brain Injury: The Kevin Bacon Effect****ASSBI President: Leanne Togher***New Zealand Rooms 3 & 4*

1. TOGHER, L

ASSBI Presidential Address: Strategies to improve the communicative interactions of people with traumatic brain injury: the Kevin Bacon effect

4:00–5:00 PM

**Debate: Neuropsychology is Redundant in the Age of Neuroimaging****Speakers: John Hodges, Erin Bigler, Mike Corballis, Hans Markovitch, Jason Mattingley***New Zealand Rooms 3 & 4***SATURDAY, JULY 9, 2011**

9:00–10:00 AM

**International Keynote Address: Memory in Social Context – from Neuropsychology to Psychiatry****Speaker: Hans Markovitch***New Zealand Rooms 3 & 4*

1. MARKOWITSCH, H

Memory in social context – from neuropsychology to psychiatry

10:00–10:30 AM

**Saturday Morning Tea***Level 5 Promenade*

10:30 AM–12:00 PM

**Session 18: Behaviour, Cognition and Communication in Children***New Zealand Room 2*

1. CRICHTON, A
2. KENARDY, J
3. BARRE, N
4. MORGAN, AT
5. EMBULDENIYA, U
6. GOULD, EL

Assessment of Post Traumatic Amnesia in Children, Determining Best Practice  
 TBI Severity and Post-traumatic Stress Symptoms in Children: The Impact of Pre and Post-injury Variables  
 Language abilities in children born very preterm and the role of the early environment  
 Chronic Dysarthria following Paediatric Traumatic Brain Injury: Neural Correlates  
 Symptomatic Focal Epilepsy in Childhood: The Cognitive Effects of Seizure Onset During a Critical Developmental Period  
 Working Memory, Attention, Academic Achievement and School Reports in Typically Developing Primary School Children

10:30 AM–12:00 PM

**Session 19: Rehabilitation Models***New Zealand Room 3*

1. HARRISON-FELIX, C
2. HOPMAN, K
3. TAEED, G
4. COUCHMAN, G
5. SHANAHAN, L
6. DURHAM, CY

A Comparison of Databases for TBI: New Zealand and the United States  
 Community-based Rehabilitation: A Comparison of Intervention Profiles and Clinical Outcomes From Two Program Models  
 Factors Determining the Nature of Community-based Rehabilitation Services Following Traumatic Brain Injury (TBI)  
 Headstart: creating social spaces for recovery from brain injury  
 Ripe for Rehab: A Contextualised Approach to Effectively Engaging Adolescents With TBI in Cognitive Rehabilitation  
 Fostering Insight and Understanding of the Social Challenges of Brain Injury

10:30 AM–12:00 PM

**Session 20: Treatments and Interventions***New Zealand Room 4*

1. BACKHAUS, S

Examination of a Cognitive-Behavioral Group Intervention to improve Self-Efficacy and Neurobehavioral Functioning in Brain Injury Survivors and their Caregivers: What Factors Influence Improvement?

2. TSAOUSIDES, T Integrating Problem Solving and Emotional Regulation Skills in a Day Treatment Program for Individuals with Traumatic Brain Injury
3. HSIEH, M Motivational interviewing and cognitive behavior therapy for anxiety following traumatic brain injury: A pilot randomized controlled trial
4. SUH, F Systematic Review of Non-Pharmacological Interventions for Attention Deficit: A Meta-Analysis
5. DOUGLAS, J Return to Work and Communication following Severe Traumatic Brain Injury
6. JANSARI, A Saving Face: Assessing Rehabilitative Training Procedures in Acquired and Developmental Prosopagnosia

**12:00–12:30 PM**

**Awards and Close of Conference**  
*New Zealand Rooms 3 & 4*



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# Abstracts Presented

## The 2011 International Neuropsychological Society Mid-Year Meeting/ASSBI 4th Pacific Rim Conference

July 6-9, 2011  
Auckland, New Zealand

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THURSDAY MORNING, JULY 7, 2011

### Poster Session 1

(posters are available from 9am-5pm, however,  
authors will be presenting during morning tea, lunch  
break and afternoon tea) :

9:00 a.m.–5:00 p.m.

### Aging

#### A. LAMMEL, A. SHORES & P. SACHDEV. HERITABILITY OF EPISODIC MEMORY IN ELDERLY TWINS.

**Objective:** Cognitive functioning is a particularly important feature in the quality of life in the elderly. Not only does the prevalence of cognitive disorders see an exponential increase in the older age group, normal ageing is also associated with changes in cognitive abilities. Episodic memory typically is the domain for which the elderly show greatest impairment, this impairment tends to precede decline in other cognitive domains, and significant impairment can be used as a marker for progression to Alzheimer's disease. As part of a doctoral thesis, this study explores the relative importance of genetic influences on episodic memory processes in a large number of non-demented elderly twins using a quantitative genetic approach.

**Participants and Methods:** Monozygotic (MZ;  $n = 134$ ) and dizygotic (DZ;  $n = 105$ ) twin pairs, 68% female, aged 65 to 88 (mean age = 70.6;  $DS = 5.2$ ), were administered four episodic memory measures: (1-2) immediate and delayed verbal memory recall (Rey Auditory Verbal Learning Test (RAVLT) and Logical Memory from the Wechsler Memory Scale - Revised (WMS-R)); (3) verbal recognition (RAVLT), and (4) visual recognition (Benton Visual Retention Test (BVRT)).

**Results:** MZ and DZ twins did not differ significantly from each other on the means and variances on age, education, or any of the episodic memory measures. Significant gender effects (regardless of zygosity) were found for immediate and delayed verbal recall and verbal recognition, with higher performance in females. Significant correlations with age were also found for all episodic memory measure. Heritabilities, estimated by structural equation modelling (OpenMx), ranged from .24 to .49. Delayed verbal recall showed the highest heritability ( $h^2 = .49$ ) while heritability for visual recognition was significantly lower.

**Conclusions:** The results of study demonstrate low to moderate influences on episodic memory performance in the elderly, yet suggest that the magnitude of these effects differ across specific types of episodic memory processes.

Correspondence: *Andrea Lammell, B.Sc. (Hons), Psychology; Macquarie University; Macquarie University; Sydney, NSW 2109, Australia. E-mail: andrea.lammell@students.mq.edu.au*

#### K. YOSHIKAZAKI, K. KURATOMI, Y. KIMURA, K. KATO & T. HATTA. Age-related impairment of modulation in visual selectivity depending on conflict frequency.

**Objective:** A number of studies demonstrated that the compatibility effect (CE) observed in the Eriksen flanker task is greater in the block

where more compatible trials appear (less conflict) than in that where less compatible trials do (more conflict) (Egner, 2007). This modulation, which is called conflict adaptation effect (CAE), reflects cognitive control. The purpose of our study was to investigate whether or not the CAE appears in the elderly.

**Participants and Methods:** Twenty students (the young adult: 22.7 years) and 20 healthy elderly (the elderly: 70.4 years;  $MMSE > 23$ ) participated. Four types of five-numeral-array (compatible: "44444" & "66666"; incompatible: "66466" & "44644") were presented to either the left (LVF) or right visual-field (RVF). Participants were asked to identify the target while ignoring flankers. Half of them firstly performed 4 blocks which comprised more conflict trials in LVF and less conflict trials in RVF and then did 4 blocks with the inverse relation between VF and conflict frequency. The other half conducted the blocks with the reverse order.

**Results:** An ANOVA with age group (young/elderly), compatibility, conflict VF (less/more conflict VF), and time course (the first/second half), was conducted with the RTs for correct responses. The significant interaction between compatibility and conflict VF suggested that the CAE appeared in both the age groups. Interestingly, this interaction was qualified by the time course. In the young adult, the CAE was obtained in both the phases, whereas in the elderly the CAE in the first half shifted to the reversed CAE in the second half.

**Conclusions:** We provided the evidence that both the young adult and the elderly groups adapt the selectivity of visual processing depending on varying conflict frequency in VF.

Secondly, we provided the evidence that the cognitive flexibility impairs with aging. In the elderly, even if the relation between the stimulus location (VF) and conflict frequency is switched, the visual selectivity in each VF is preserved.

Correspondence: *Kazuhito Yoshizaki, Ph. D., Psychology; Aichi Shukutoku University; 9, Katahira-Nagakute., Nagkute-cho, Aichi 480-1197, Japan. E-mail: yoshizak@asu.aasa.ac.jp*

### Assessment/Psychometrics/Methods (Adult)

#### Y. HSU & M. HUA. Do the Self-reported and the Objective Forms of Prospective Memory Measures Assess the Congruous Psychological Construct?

**Objective:** Self-reported questionnaire is an economic and efficient way to collect information in clinical settings; however, its compatibility to the objective task performance is debatable. Few studies have examined the congruity of these two forms of clinical tools assessing prospective memory. The present study thus aimed to explore this issue.

**Participants and Methods:** Thirty healthy young adults received the Prospective and Retrospective Memory Questionnaire (PRMQ) and the Cambridge Prospective Memory Test (CAMPROMT). Each subject received a battery of neuropsychological tests including verbal and visual episodic memory, working memory, executive function, attention, and emotional status.

**Results:** There was no remarkable relationship between scores of the self-reported PRMQ and the CAMPROMT. The performance score of the event-based prospective memory task was significantly correlated with that of the Category Fluency test. No significant relationship was found between the PRMQ and other neuropsychological test scores.

**Conclusions:** Based on the results, it appears that two forms of prospective memory tools did not measure the congruous construct. In light of the objective form of the task markedly associated with executive function as observed in literature, we thus suggest that self-reported questionnaire alone might not be adequate to assess prospective memory in clinical settings.

Correspondence: *Mau-Sun Hua, PhD, Psychology, National Taiwan University, No. 1, Sec. 4, Roosevelt Rd., Taipei 10617, Taiwan. E-mail: huams@ntu.edu.tw*

**C.M. KRAAN, R. STOLWYK & R. TESTA. The Cognitive Constructs Underlying Verbal Fluency Performance Vary According to Test Type and Lifespan.**

**Objective:** A number of different Verbal Fluency test types are used for research and clinical purposes across the lifespan. It was hypothesised that the cognitive constructs underlying different Verbal Fluency test performances would differ according to test type and age.

**Participants and Methods:** The strengths of relationships between a select group of cognitive constructs (estimated Verbal IQ, semantics/word retrieval, processing speed, working memory and inhibition) and Verbal Fluency test types (phonemic, semantic, alternating and excluded letter) were examined through Pearson's correlation coefficients in 93 young (18-35 yo) and 30 older (65 - 79 yo) healthy individuals.

**Results:** Interesting age differences were observed. Specifically, small to moderate significant positive correlations between each Verbal Fluency test and semantics/word retrieval, processing speed and high load working memory were found in the younger, but not the older cohort. Furthermore, a moderate significant positive correlation between excluded letter fluency and inhibition was observed in the older, but not the younger cohort. Correlations between fluency tests and estimated Verbal IQ were observed in both groups however the strength of the relationship increased with age.

**Conclusions:** There are three main conclusions. First, researchers and clinicians need to control for Verbal IQ when investigating Verbal Fluency performance in young and old individuals. Second, older individuals are less influenced by semantics/word retrieval and processing speed than younger individuals. Third, in older individuals, excluded letter fluency is potentially a more successful marker of the executive process 'inhibition' than conventional fluency tests. Extension of this pilot with a larger sample of older individuals is warranted.

Correspondence: *Claudine M. Kraan, Behavioural Neuroscience (Hons), Psychology & Psychiatry, 37 Bareena Drive, Mount Eliza, VIC 3930, Australia. E-mail: cmkra1@student.monash.edu*

## Cancer

**S.L. REMINGER, M. MEINHARDT, T. PATTON, S. LUNDY & K. KAEMINGCK. The Relationship Between Mood Symptoms and Neuropsychological Function in Breast Cancer Survivors.**

**Objective:** Breast cancer survivors show neuropsychological deficits in domains such as language and memory that are suspected to be a result of the harmful effects of cancer treatments. Mood symptoms may exacerbate these problems, however, little is known about the exact relationship between these variables.

**Participants and Methods:** We examined a group of 87 breast cancer survivors, mean age 58.7 years, who had received diagnoses of breast cancer 2-22 years prior (mean 6.1 years). Participants completed a battery of neuropsychological tests that assessed intellectual function, executive function, and memory, and several self-report questionnaires that assessed mood, fatigue, and quality of life.

**Results:** Pearson analyses demonstrated significant negative correlations between scores on the Beck Depression Inventory-II (BDI-II; Beck, Steer & Brown, 1996) and the Full Scale IQ, Verbal Comprehension Index, and Processing Speed Index scores of the Wechsler Adult Intelligence Scale-III (Wechsler, 1997). BDI-II scores also showed significant negative correlations with some measures of executive function, but not with measures of memory. Analysis of variance showed that breast cancer survivors who had been treated with chemotherapy reported more symptoms of depression than individuals who had not been treated with chemotherapy,  $F = 9.51, p = .003$ . A similar pattern was not found for individuals who had been treated with radiation. Patients' history of chemotherapy and radiation treatment did not show any relationship to subsequent neuropsychological function.

**Conclusions:** Results suggest that elevated mood symptoms may be related to problems in some domains of neuropsychological performance in breast cancer survivors. Individuals who had received chemotherapy appeared more likely to experience subsequent mood problems. Further investigation is needed to determine if mood changes may increase susceptibility to the cognitive deficits experienced by breast cancer survivors. Acknowledgement: Study funded by Susan G. Komen for the Cure.

Correspondence: *Sheryl L. Reminger, Ph.D., Psychology, University of Illinois at Springfield, One University Plaza, UHB 3144, Springfield, IL 62704. E-mail: sremi2@uis.edu*

## Cognitive Neuroscience

**Y.N. LAMB. Influence of Brain-Derived Neurotrophic Factor (BDNF) and Catechol-O-Methyltransferase (COMT) Polymorphisms on Recall and Recognition.**

**Objective:** Single nucleotide polymorphisms in the brain-derived neurotrophic factor (BDNF) gene and the catechol-O-methyltransferase (COMT) gene influence brain structure and function, as well as cognitive abilities. They are most influential in the hippocampus and prefrontal cortex (PFC), respectively. Recall and recognition are forms of memory proposed to have differing neural substrates, with recall having a greater dependency on the PFC and hippocampus. This study aimed to determine whether the BDNF val66met or COMT val158met polymorphisms differentially affect recall and recognition, and whether these polymorphisms interact. Both polymorphisms were predicted to influence recall performance while not affecting recognition. An interaction between the genes was also hypothesised.

**Participants and Methods:** A sample of 20 healthy young adults was genotyped and assessed on both recall and familiarity-based recognition.

**Results:** A factorial ANOVA conducted on the data found both polymorphisms to be significantly associated with poorer recall ability, while not influencing recognition. There were significant two-way interactions between the BDNF and COMT polymorphisms for both recall and recognition.

**Conclusions:** Support was found for all hypotheses. Results highlight the importance of distinguishing between recall and familiarity-based recognition in research. Further investigation into the interactions between the polymorphisms is warranted.

Correspondence: *Yvette N. Lamb, BSc (Hons), Psychology, University of Auckland, 26 Tupaki Place, Pakuranga, Auckland 2010, New Zealand. E-mail: ylam033@aucklanduni.ac.nz*

**V.C. MARTIN, D.L. SCHACTER, M.C. CORBALLIS & D. ADDIS. Prior Construction of Imagined Events Affects Degree of Core Autobiographical Network Activation.**

**Objective:** A recent interest in the neural basis of imagined future events has resulted in numerous studies and a variety of experimental paradigms. The neural network involved in future simulation overlaps with that mediating memory for past events. Some studies report that this core network is more active when simulating the future than remembering the past, while other studies report the opposite effect. Task differences may underlie these conflicting results; paradigms requiring participants to imagine events for the first time in the fMRI session have produced a future>past effect while paradigms in which participants first imagine events outside the scanner have reported a past>future effect. To investigate this issue directly, we sought to characterize the functional differences between these two types of imagined events.

**Participants and Methods:** Young adults (N=25) participated in this fMRI study. During a prescan session outside the scanner, they constructed future events in response to person, location, and object cue sets. In the scanning session a week later, participants were shown these cue sets again and asked to imagine these already-constructed events. They were also shown new cue sets and asked to imagine new future events for the first time.

**Results:** Constructing new future events engaged the core network more than imagining previously-constructed events ( $p < .05$  corrected). This effect was evident in the bilateral anterior hippocampus and parahippocampal gyrus, left amygdala, medial orbitofrontal cortex, right middle temporal gyrus, precuneus and posterior cingulate.

**Conclusions:** Constructing imagined future events while in the scanner recruits several components of the network mediating future simulation to a higher degree than when imagining already-constructed events. This finding suggests an important distinction between paradigms in which participants create new events and those in which participants imagine events that were previously constructed.

Correspondence: *Victoria C. Martin, Psychology, University of Auckland, 2/16 Glen Atkinson Street, St Heliers, Auckland 1071, New Zealand. E-mail: v.martin@auckland.ac.nz*

#### **E. MATUTE & Y. CHAMORRO. The Influence of Educational Levels on the Performance of an Antisaccadic Eye Movement Task.**

**Objective:** The aim of this study was to determine if educational levels, based on the number of school years attended or reading proficiency, explain variations in the performance of an antisaccadic task.

**Participants and Methods:** A group of 14 adults was evaluated (8 men, 6 women). Mean age was 34 years (SD=6.37), and all were right-handed. Participants were divided into two groups according to their educational level: High school (10-12 years of school, n=6, C.I. = 105 ± 8.62) and graduate or postgraduate (16-18 years of school, n= 8, CI = 118 ± 7.69). Subjects were asked to read a text in order to assess speed, accuracy and reading comprehension as measures of reading level. All subjects performed one prosaccadic and one antisaccadic task; each with an overlap and a gap condition. In total, 4 blocks were used. Ocular movement was tracked with the Tobii Eye Tracker ET-1750 (Technology Tobii, A.B.)

**Results:** A higher number of direction errors across the antisaccadic blocks, especially in the gap condition, was seen in both groups. Comparisons of the number of direction errors between groups showed that the high school group made slightly more such errors in the antisaccadic blocks, but the difference was not significant. Correlation analyses made between the saccadic and reading measures for the whole sample showed a correlation between reading errors and direction errors in both conditions of eye movement on both types of tasks. Also, a low level of reading comprehension was associated with a higher number of direction errors in the overlap antisaccadic block. No correlation between reading speed and saccadic tasks was observed.

**Conclusions:** No differences were found with respect to the number of years of education; however, associations between reading proficiency and the saccadic measures were evident. These results suggest that performance on saccadic tasks could be influenced by sociocultural variables, particularly reading proficiency.

Correspondence: *Esmeralda Matute, Ph.D., Instituto de Neurociencias, Universidad de Guadalajara, Francisco de Quevedo 150, Guadalajara 44130, Mexico. E-mail: ematute@cencar.udg.mx*

#### **K. MORADY & G. HUMPHREYS. Eye movements in action disorganisation syndrome: A single case analysis.**

**Objective:** There is a long history of attempts to use eye movements to infer cognitive processes. The role that eye movements may play in the behaviour of patients with acquired problems in everyday action has been relatively little studied. The present study examined the relation between eye movement and everyday action in a patient who presented with Action Disorganisation Syndrome.

**Participants and Methods:** BL (30 years old) suffered a stroke in 1998, affecting her left occipito-temporal cortex. BL and two control patients and two non-brain-lesioned participants studied in two simple everyday tasks. Eye movement and the direction of fixation were recorded using a head-mounted video capture system. Actions were monitored also from an external viewpoint for further analyses. The number of fixations and the fixation start and end points were analysed frame by frame.

**Results:** We analysed the ratio of number of fixations to time on task. The comparison showed that BL made significantly more fixations during the tasks relative to the time taken. The number of relevant compared to irrelevant fixations made by BL and the control patients were assessed in a chi square test. BL made proportionately more unrelated fixations than the patient controls. BL classified the type of fixation into the categories Locating, Directing, Guiding, and Checking according to Land et al.'s (1998) criteria for categorising the functions of different fixations. BL tended to make higher proportions of "Locating" and "Other" fixations.

**Conclusions:** The present results indicate that eye movement patterns in ADS patients can be revealing about the nature of the underlying

problems patients' experience. Notably there are changes in task-driven guidance of eye movements which still have intact the local relation between a reaching and grasping response and the immediately preceding fixation to the object. This association is consistent with different functional and neural responses determining the different stages of task performance.

Correspondence: *Kamelia Morady, SCS-IPM, Niavaran, Tehran P.O. Box 19395-5746, Islamic Republic of Iran. E-mail: kamelia.morady@gmail.com*

#### **K. MORADY & G. HUMPHREYS. Automatic Guidance of Auditory Attention from Working Memory.**

**Objective:** There are many researches demonstrate that working memory plays an important role in top-down attentional guidance. Earlier findings in vision, touch, and audition suggest that WM is important for successful selective attention regardless of the sensory modality of the task. The present study sought to investigate whether the maintenance of a sound in working memory attracts our attention in auditory space? Additionally, are there cross-modal links between working memory and selection? Does the maintenance of an auditory stimulus attract attention to the equivalent visual stimulus and to semantically stimulus as well?

**Participants and Methods:** We tested performance in an auditory search task, in which we asked participants to memorize a sound (prime) and then we asked them to search for a target sound in a search field of different sounds to assess whether a stimulus in WM influenced search efficiency. In Experiment 1, the prime stimuli were the picture not the sound of stimuli and Experiment 2 tested the influence of a semantically cue on finding a target in an auditory search field. In all three Experiments, the bottom-up effect and automaticity were controlled separately. Twenty five volunteers (17 men and 8 women) took part in experiments.

**Results:** In all the experiments in this study, RTs were analyzed for correct responses in the search-identification task and paired-sample t-test was used to compare mean of RTs in different conditions. Pairwise comparisons showed faster performance in the Valid trials than Invalid trials and Neutral trials. In Bottom-up and Automaticity control, we failed to observe priming effects under conditions in which the prime did not have to be maintained in WM.

**Conclusions:** The effects of the contents of WM on attention have been studied within auditory modality. Cross-modal links between WM and selection have been studied. The results showed that the maintenance of an auditory stimulus attract attention to the equivalent visual and semantically stimulus.

Correspondence: *Kamelia Morady, SCS-IPM, Niavaran, Tehran P.O. Box 19395-5746, Islamic Republic of Iran. E-mail: kamelia.morady@gmail.com*

#### **J.J. SIMON, S. KAISER, T.S. SCHWEIZER, A. KALIS & A. MOJZISCH. Generating options for action: cognitive and neural correlates.**

**Objective:** Current approaches to decision-making focus on the selection between options. However, real world situations are commonly ill-structured and options for action are not directly defined by the situation. Thus, active generation of options is required. We have therefore developed a new paradigm to address the cognitive and neural correlates of option generation.

**Participants and Methods:** Participants were visually presented with short real-world scenarios requiring generation of options. In study 1, 52 undergraduate students performed the behavioral task in conjunction with a neuropsychological test battery. In study 2, 20 undergraduate students performed the task while undergoing functional magnetic resonance imaging.

**Results:** In study 1 the quantity of options generated correlated positively with long-term memory retrieval and category fluency, but not with other measures of executive function and creativity. In study 2 the contrast between option generation and an active control condition yielded a large cluster in the left anterior prefrontal cortex (BA10).

**Conclusions:** Both behavioral and neuroimaging results suggest that option generation requires self-ordered retrieval from long-term memory. The strong activation of the anterior prefrontal cortex is consistent with lesion studies, which show impairments restricted to behavior in ill-structured situations. This research contributes to a neuropsychological framework for decision-making in a real-world context.

Correspondence: *Joe J. Simon, Dipl. Psych., Section of Experimental Psychopathology and Neurophysiology, University of Heidelberg, Vofstr. 4, Heidelberg 69115, Germany. E-mail: joe.simon@med.uni-heidelberg.de*

**L. ZHAVORONKOVA, A. ZHARIKOVA & S. KUPTSOVA. Peculiarities of dual task performance in healthy persons (postural control and calculation).**

**Objective:** Role of integration and interference during information processing from different channels remains the subject for discussion. The dual task is a paradigm of exploring brain functioning in this condition. Features of performance of separate motor and cognitive tasks and dual tasks can give knowledge about domination of one of these processes. In this study we compared features of healthy persons performance in isolated and dual tasks and analyzed their correlation with psychological parameters.

**Participants and Methods:** Twenty-eight healthy subjects (27.6±0.07 y.o.) participated in the study. Motor task included postural tests with two different levels of difficulty. Cognitive task included two types of calculation. Subjects performed these tasks separately and then simultaneously. Posturographic parameters and success in cognitive task have been estimated. Psychological evaluation using the battery of tests allowed estimating reserves of attention, memory and executive functions.

**Results:** As a rule, performance in any motor component didn't change significantly in every task. This fact can reflect the priority of postural control. In contrary quality of performance in cognitive task decreased in dual task with simple cognitive component and increased in difficult dual tasks in some individuals. The psychological analysis has shown that more successful performance of dual tasks correlated with larger reserves of attention, memory and executive functions.

**Conclusions:** Thus, interference prevails in dual tasks performance in healthy subjects. Although in subjects with higher cognitive resources the integration can have place during simultaneous analysis of concurrent information. Supported by RHRF 10-06-00114a

Correspondence: *Ludmila Zharovonkova, PhD, Dr of Sciences, Clinical Neurophysiology, Institute of Higher Nervous Activity and Neurophysiology, Butlerova 5a, Moscow 117485, Russian Federation. E-mail: lzharovonkova@hotmail.com*

## Dementia

**S. CRAWFORD, J. EVANS, L. WHITNALL & J. ROBERTSON. A Systematic Review of the Accuracy and Clinical Utility of the Addenbrooke's Cognitive Examination and the Addenbrooke's Cognitive Examination – Revised in the Diagnosis of Dementia.**

**Objective:** To review the evidence relating to the diagnostic accuracy and clinical utility of the Addenbrooke's Cognitive Examination (ACE) and its updated version, the Addenbrooke's Cognitive Examination – Revised (ACE-R) in relation to the diagnosis of dementia.

**Participants and Methods:** A systematic search of relevant databases was conducted covering the period 2000 to April 2010. Specific journals and reference lists were hand searched. Identified studies that fulfilled the inclusion criteria were reviewed using a tailored, methodological quality rating checklist.

**Results:** The systematic search process identified 9 studies for review (7 relating to the ACE, 2 on the ACE-R). Strengths and weaknesses across studies were considered and diagnostic accuracy measures were presented for 6 out of the 9 studies.

**Conclusions:** The evidence suggests that the ACE/ACE-R are capable of providing information on a range of cognitive domains and differentiating well between those with and those without cognitive impairment. Further research examining how the tools distinguish between dementia subtypes and Mild Cognitive Impairment will further benefit the evidence base.

Correspondence: *Stephanie Crawford, Section of Psychological Medicine, University of Glasgow, Academic Centre, Gartnavel Royal Hospital, 1055 Great Western Road, Glasgow G12 0XH, United Kingdom. E-mail: scrawford@nhs.net*

**S. CRAWFORD, L. WHITNALL, J. ROBERTSON & J. EVANS. An Investigation of Rater Reliability of the Addenbrooke's Cognitive Examination – Revised (ACE-R).**

**Objective:** The Addenbrooke's Cognitive Examination – Revised (ACE-R) is a widely used dementia screening tool. The objectives of this study were to investigate rater accuracy in scoring the ACE-R in terms of its total and subscale scores.

**Participants and Methods:** Three filmed vignettes of the ACE-R being administered to older adult actors (mock patients) were used to assess scoring accuracy across multiple raters. The vignettes had a pre-determined 'true score'. Study participants were required to complete ACE-R scoring sheets for each vignette. Participants were Community Psychiatric Nurses and Trainee Clinical Psychologists.

**Results:** Participant scores were compared with the pre-determined true scores as a means of measuring scoring accuracy. The results indicated that the majority of participant scores were either the same as or within two points of the true scores. However, when compared to the true scores participant total scores differed significantly on two out of the three vignettes. Scoring accuracy was lowest for the Memory subscale of the ACE-R. Scoring accuracy issues were also identified for the Visuospatial and Attention and Orientation subscales. Individual items which had low scoring accuracy were identified.

**Conclusions:** The majority of participants scored the same as or within two points of the true scores. Whilst this level of deviation is small and unlikely to be of clinical significance in most cases, the current study highlights the importance of being cautious in interpreting test scores in relation to published cut-off scores. Professionals using the ACE-R should ensure they are familiar with scoring guidelines for the items highlighted as having lower scoring accuracy.

Correspondence: *Stephanie Crawford, Section of Psychological Medicine, University of Glasgow, Academic Centre, Gartnavel Royal Hospital, 1055 Great Western Road, Glasgow G12 0XH, United Kingdom. E-mail: scrawford@nhs.net*

**E. HELMES. Cognitive Screening of Older Adults: The Utility of Pentagon Drawing.**

**Objective:** Drawing tests have a long history in neuropsychological assessment. Such tasks have used a range of abstract shapes and objects, including simple geometric figures, houses, 3-dimensional cubes, and human figures. A popular geometric figure has been the two intersecting pentagons originally popularized in the Bender Gestalt test. Reproducing the pentagons was the main visuospatial task on the original Mini-Mental State Examination, and it remains in use in the revised version of that widely used screening test. Scoring criteria on the MMSE are binary: perfect reproduction of two five-sided figures with a four-sided figure at the intersection. The modified MMSE of Teng and Chui (1987) used more refined 10-point scoring for the elements of the figure, which should be more reliable and provide better group discrimination.

**Participants and Methods:** Pentagon drawings from 8,702 older community-dwelling Canadians (59.3% female), with a mean age of 75.5 years (SD = 6.99) and 10.1 years of education (SD = 3.89) were used. Mean scores for the whole sample are reported, as well as for sub-samples who underwent a full clinical assessment and were diagnosed as cognitively intact, demented, or cognitively impaired, but not demented. Logistic regression was used to evaluate the utility of pentagon drawing as a diagnostic tool to diagnose cognitive impairment.

**Results:** Binary scoring was less effective in discriminating groups than the 10-point system and less reliable.

**Conclusions:** The discussion focuses on the role of simple, nonverbal tasks in the cognitive screening of older adults.

Correspondence: *Edward Helmes, Ph.D., Psychology, James Cook University, James Cook Drive, Townsville, QLD 4811, Australia. E-mail: edward.helmes@jcu.edu.au*

**A. KIRK, C. LACNY, D.G. MORGAN & C. KARUNANAYAKE. Neither Day Length Nor Outdoor Temperature Extremes Affect Cognitive Performance In Rural And Remote Memory Clinic Patients.**

**Objective:** To determine whether day length or outdoor temperature affect cognitive performance in rural and remote memory clinic patients.

**Participants and Methods:** A rural and remote memory clinic in Saskatchewan provided an opportunity to examine how cognitive performance on the Mini-Mental State Exam (MMSE) is influenced

by day length and temperature. Saskatchewan is an ideal location to test this association as there is tremendous seasonal and geographical variation. Following an initial assessment by the Rural and Remote Memory Clinic (RRMC) team in Saskatoon, patient follow-up appointments were performed either in-person or via telehealth videoconference. At each follow-up appointment the clinic neurologist administered the MMSE. The relationship between day length and MMSE scores at the 6-week follow up appointment was analyzed in 154 patients. Climate data were acquired through the Canadian Weather Network's historical database and Environment Canada's National Climate Data and Information Archive. The mean daily temperature was controlled for in the analysis. Bivariate correlate and linear regression analyses were conducted.

**Results:** There was no significant association between MMSE scores and either minutes of day length ( $p=0.477$ ) or mean daily temperature ( $p=0.554$ ). The statistical analysis was repeated for patients with scores less than the median score, 22 (SD 6.1;  $n=72$ ), in order to focus our analysis on patients with more severe dementia. Again, we found there was no significant correlation between MMSE score and day length ( $p=0.642$ ) or mean temperature ( $p=0.512$ ).

**Conclusions:** Day length and outdoor temperature do not significantly influence cognitive performance of rural and remote memory clinic patients.

Correspondence: *Andrew Kirk, MD, Neurology, Royal University Hospital, Saskatoon, SK S7N 0W8, Canada. E-mail: andrew.kirk@usask.ca*

### C. O'CALLAGHAN, J. BATCHELOR, J.R. HODGES & M. HORNBERGER. A Convergent Approach Towards Disinhibition in Frontotemporal Dementia.

**Objective:** Disinhibition is a prominent feature of frontotemporal dementia (FTD), but as yet it is not well characterised and its potential utility as a diagnostic marker remains underexplored. We contrasted inhibitory processes in FTD and Alzheimer's disease (AD) patients, via a convergent approach, employing questionnaire, neuropsychological and experimental measures.

**Participants and Methods:** Thirteen FTD patients, 7 AD patients and 15 age- and education-matched healthy controls were tested. Disinhibition measures included a behavioural questionnaire (The Barrett Impulsiveness Scale) to assess impulsivity, The Hayling Test of inhibitory functioning, the Excluded-Letter Fluency test and an experimental go/no-go task that was modulated via motivational incentives (i.e. reward) and emotionality of the test material.

**Results:** Participants did not differ significantly for age, education and length of disease. FTD patients were reliably impaired on all inhibition measures, relative to controls. Surprisingly, however, AD patients showed a similar level of disinhibition and only The Barrett Impulsiveness Scale differentiated the FTD and AD groups reliably. Nevertheless, different disinhibition patterns were observed across the patient groups with regard to errors on the excluded-letter fluency task (where FTD patients were particularly impaired on a rule-break measure) and in relation to the emotion and reward variables on the go/no-go task (where emotion and reward failed to modulate performance in FTD patients).

**Conclusions:** There is convergent evidence for a generalised breakdown of inhibitory processes in FTD across questionnaire, neuropsychological and experimental measures. Of note is that the failure of emotional and reward incentives to improve inhibition performance corroborates findings that all these processes share a similar neural circuitry. On a clinical level, disinhibition measured via a questionnaire appears to have the best diagnostic utility in distinguishing disinhibition in FTD and AD. Correspondence: *Claire O'Callaghan, Masters of Clinical Neuropsychology, Neuroscience Research Australia, Cnr Barker & Easy Street, Randwick, NSW 2031, Australia. E-mail: o\_callaghan\_claire@hotmail.com*

### M. RICCI, S. GRAEF, C. BLUNDO & L. MILLER. Rey Auditory Verbal Learning Test (RAVLT): a useful tool for differentiating Alzheimer's Dementia from behavioral variant Fronto-Temporal Dementia.

**Objective:** The RAVLT can show that patterns of learning, retrieval and/or recognition deficits differ according to site of lesion. Because different brain regions are affected by the underlying pathology in Alzheimer's Disease (AD) and behavioral variant Fronto-Temporal Dementia (bvFTD), one might predict different sorts of memory deficits to be found in association with each disease.

**Participants and Methods:** We examined groups of Italian (32 AD, 28 bvFTD, 49 normal control) and Australian (20 AD and 10 bvFTD) subjects on two slightly different versions of the RAVLT. Italian subjects had a mean age of 69 and mean educational level of 8.7 years, whereas Australian patients had a mean age of 65 and a mean education level of 12 years. We considered the following scores: Total Learning, 20 min Delayed Recall, Correct Hits on recognition and False Positives on recognition.

**Results:** Multivariate analysis revealed significant between-group differences for both samples and on all RAVLT scores, but no individual score was particularly good for classifying subjects. However, ROC analysis revealed the usefulness of a new equation [(Delay Recall/Total Learning) + (Correct Hits - False Positives)] for making these distinctions. With a cut-off score of 13, the equation yielded excellent specificity and sensitivity in distinguishing normal subjects from dementia patients (88.5 and 98, respectively). The equation also differentiated AD and bvFTD groups in both samples, with a higher cut-off score needed to classify subjects with a lower educational level.

**Conclusions:** Our results confirm the usefulness of the RAVLT and, in particular, our new equation for discriminating NC, AD and bvFTD subjects. Correspondence: *Monica Ricci, Macquarie Centre for Cognitive Science, Macquarie University, Balaclava Road, Sydney, NSW 2109, Australia. E-mail: monica.ricci@mq.edu.au*

### Drug/Toxin-Related Disorders (Including Alcoholism)

#### M. WEINBORN, S. WOODS & K. PARK. Prospective Memory Ability Amongst Ecstasy and Heavy-Alcohol Using Young Adults.

**Objective:** Self-reported difficulties with prospective memory (ProM), often described as "remembering to remember", have been found in ecstasy users, as well as heavy alcohol users. However, while studies using objective ProM measures have supported this association amongst ecstasy users, studies using objective ProM measures with heavy alcohol users are lacking. Further, the comparative ProM ability of these two groups has not been evaluated. In the current study, an adapted version of the Memory for Intentions Screening Test (MIST), a recently published objective clinical measure of ProM, was administered to three groups of young adults aged 18-30.

**Participants and Methods:** There were 31 ecstasy users (ExU; median 30 uses), 21 heavy alcohol users (ALC; mean AUDIT score > 15), and 31 healthy comparison participants (HC; no substance use, AUDIT score < 8). Participants with a history of neurologically relevant diagnoses (e.g., TBI, ADHD), severe mental illness, or recent use of substances were excluded. Groups were comparable for gender, ethnicity, self-reported mood, education and estimated IQ, but the ExU group was marginally older than the HC and ALC groups (21.4 vs. 19.7 and 19.5 years old, respectively).

**Results:** Results indicated that the ExU group performed more poorly than HC on Time-Based, but not Event-Based ProM tasks, even after controlling for age and self-reported sleepiness. Of note, poorer Time-Based ProM was associated with longer duration of ecstasy use. The ExU group also had more difficulty in completing ProM tasks with longer (15 min) compared with short (2 min) delays. The ALC did not display difficulty on any objective ProM task compared with HC.

**Conclusions:** In conclusion, results indicate that ecstasy users are at risk for deficits in Time-Based ProM, consistent with the hypothesized frontal lobe changes associated with ecstasy use. Further study is needed to identify what aspects of the ProM process (e.g., monitoring, cognitive resource allocation) may be most problematic for ecstasy users.

Correspondence: *Michael Weinborn, Ph.D., Psychology, University Of Western Australia, 35 Stirling Highway, Perth, WA 6009, Australia. E-mail: michael.weinborn@uwa.edu.au*

### Emotional Processes

#### K. RYMARCZYK, K. JANKOWIAK-SIUDA & H. MAJCYNSKI. Sex Differences in Facial Imitation- EMG Study.

**Objective:** Men and women show differences in perceiving facial displays of emotion. Much of the evidence shows that women are better in identifying various displays of facial affect. However, little is known about sex differences in reactions to emotional facial expressions. The main aim of the present study was to examine gender differences in facial imitation, when viewing dynamic (video movie) facial expressions.

**Participants and Methods:** Thirty subjects (men and women) were exposed to dynamic stimuli of happy, anger, fear and surprise faces while facial electromyographic (EMG) activity from M. zygomaticus major and M. corrugator supercilii regions was recorded.

**Results:** The analysis of data showed differences in muscle activity between gender, muscle and stimuli during a long exposure time (3500 ms). The subjects reacted to happy faces with increased zygomaticus muscle activity and decreased corrugator muscle activity. As expected, angry faces evoked alterations in activity of the corrugator muscle only; fear expressions did not evoke significant changes in EMG activity of none of the muscles. Comparison between male and female participants revealed that men responded with increased activity in the zygomatic muscle when viewing both angry and surprise faces while women had more corrugator muscle activity when viewing angry faces and less when viewing happy faces.

**Conclusions:** It was shown that males tended to smile more, when viewing angry faces than when viewing happy faces whereas women smiled less and frowned more when viewing angry faces compared to viewing smiling faces. It would be also interesting to do further research on empathy, as emotional responsiveness.

Correspondence: *Krzyszyna Rymarczyk, Nencki Institute of Experimental Biology, Pasteura 3, Warsaw 02-495, Poland. E-mail: kr@nencki.gov.pl*

### Executive Functions/Frontal Lobes

**N.J. STARKEY & R.B. ISLER. The Relationship Between Neuropsychological Functioning and On-Road Driving Behaviour in Young, Novice Drivers.**

**Objective:** Safe driving requires a variety of cognitive skills, many of which could be classed as executive functions (e.g., divided attention, mental flexibility, working memory, impulse control). Research suggests that frontal lobe development continues into the mid 20's, and coincides with the time that age disappears as a risk factor for crashes. However, this is also well above the age at which most countries allow young people to drive solo. To investigate this further, this study was conducted to examine the relationship between executive function, cognitive ability and on-road driving behaviour in young novice drivers.

**Participants and Methods:** Thirty six teenage drivers (23 male; 13 female, average age 16.3 yrs) attending a two week Driver Training Research camp, completed a battery of tests to assess their general ability and executive function. In addition, they completed a computerised hazard detection test and an on-road driving assessment.

**Results:** Analyses indicated that verbal IQ, working memory, cognitive switching and attention were positively correlated with on-road driving performance, while only verbal IQ, inhibition and complex information processing were related to hazard detection. In addition, verbal IQ, complex information processing and attention were related to more accurate driving skill self-evaluations.

**Conclusions:** Together these findings suggest that there is a relationship between participants' performance on neuropsychological tests and their on-road driving performance. Further research using a larger number of participants and a more extensive test battery will help clarify the important links between executive functions, cognitive ability and on-road driving behaviour. In turn, such findings could be used to inform the development of driver training programmes and psychological interventions, which target specific skill development.

Correspondence: *Nicola J. Starkey, PhD, School of Psychology, Univ of Waikato, Private Bag 3105, Hamilton 3240, New Zealand. E-mail: nstarkey@waikato.ac.nz*

### Hemispheric Asymmetry/Laterality/Callosal Studies

**G. BADZAKOVA-TRAJKOV, I.S. HÄBERLING & M.C. CORBALLIS. Magical Ideation, Creativity, Handedness, and Cerebral Asymmetries: a Combined Behavioural and fMRI Study.**

**Objective:** Magical ideation has been shown to be related to measures of hand preference, in which those with mixed handedness exhibit higher levels of magical ideation than those with either consistent left- or right-handedness. It is unclear whether this relationship is the result of a bias

in questionnaire-taking behavior or some neuropsychological concomitant of cerebral specialization such as reduced cerebral lateralization. We sought to replicate this finding and further investigate how magical ideation is related to other measures of laterality, including handedness performance measures, creativity achievement, and cerebral asymmetries for language, spatial judgment, and face processing.

**Participants and Methods:** Over 150 participants were assessed on all measures. Handedness preference was assessed using a modified version of the Edinburgh Handedness Inventory whereas handedness performance was assessed using a computer based finger-tapping task. Creativity achievement was assessed by questionnaire. All cerebral asymmetries were evaluated using well established fMRI paradigms. Laterality indices were calculated for all the measures, except for the creative achievement measure, and correlated with each other.

**Results:** Magical ideation and creativity were positively correlated, and both were negatively correlated with absolute hand preference but not with hand performance or any of the cerebral asymmetries being assessed.

**Conclusions:** The results do not support the notion that the observed association between magical ideation, creativity and hand preference has a neuropsychological explanation based on reduced cerebral lateralization. Correspondence: *Gjurgjica O. Badzakova Trajkov, PhD, Psychology, The University of Auckland, 257a Royal Rd, Auckland 0614, New Zealand. E-mail: guk1@yahoo.com*

**V. HARMS & L. ELIAS. Lateralization of Melodic Processing after Hemispherectomy Compared to Neurologically Normal Participants.**

**Objective:** Music processing has traditionally been viewed as a right-hemisphere dominant task. Evidence from a variety of sources demonstrates that general processing of melodic structure and unfamiliar melody recognition both show strong right hemisphere biases. However, some evidence suggests that the left hemisphere plays a key role in analytic processing of music whereas the right hemisphere is important for holistic processing in music (Bever&Chiarello, 1974). Using an unfamiliar melody recognition task, we assessed the relative contribution of the left and right hemispheres to music processing.

**Participants and Methods:** Participants were two hemispherectomy patients (P1 had the left hemisphere removed, P2 had the right hemisphere removed) and a control group of right-handed, neurologically healthy individuals (n=49). Participants completed an unfamiliar melody recognition task wherein pairs of melodies were presented at a rate of 240 bpm, one melody to each ear. Participants were asked to indicate whether or not a target melody had been presented. Holding rhythm constant, all melodies began on middle C and all notes fell within one octave of middle C.

**Results:** Overall accuracy in target discrimination revealed a strong advantage for P2 (100% accuracy) in comparison to P1 (36% accuracy). Calculating a bias score for accuracy for the control group demonstrated no bias in hemispheric processing for the task ( $M = .257, p = .156$ ).

**Conclusions:** The comparison of P1 and P2 supports the view that the left hemisphere plays an important role in the processing of musical information. The similarity in the melodies being played, in both rhythm and range of notes, may have required a more analytic strategy for accurate melody discrimination. The failure to find a significant hemispheric bias in the control group may indicate a variety of strategies being employed for melody discrimination.

Correspondence: *Victoria Harms, Psychology, Dept of Psychology, 9 Campus Dr., Saskatoon, SK S7N 5A5, Canada. E-mail: v.harms@usask.ca*

**N. HAUGRUD, C. ESOPENKO & M. CROSSLEY. Examining Laterality in Verbal Fluency Performance 40 Years Following Left or Right Hemispherectomy.**

**Objective:** Previous research has demonstrated phonemic verbal fluency performance is dependent on the left prefrontal brain region, while semantic verbal fluency performance can be impacted by left or right hemisphere lesions (Stuss et al., 1998). Troyer et al. (1997) divided verbal fluency performance into clustering (i.e. the generation of words within a subcategory, associated with bilateral temporal lobe functioning) and switching strategies (i.e. the ability to shift to a new category, associated with left frontal lobe functioning). The present study examined laterality in verbal fluency performance by comparing two women 40 years after left or right hemispherectomy surgery.

**Participants and Methods:** JH is a 54 year old woman who had left sided hemispherectomy surgery at age 16. SM is a 52 year old woman who had right sided hemispherectomy surgery at age 13. Participants completed phonemic (CFL) and semantic (animal naming) verbal fluency tasks and were compared to previously published norms for total words produced, and for measures of clustering and switching (Lanting et al., 2009, Troyer et al., 1997).

**Results:** JH showed impaired total word production on both phonemic and semantic fluency, whereas SM's performance was only impaired on semantic fluency. JH also showed decreased switching between clusters of words, whereas SM produced more errors.

**Conclusions:** Examination of JH (left hemispherectomy) and SM (right hemispherectomy) contributes to models of laterality in verbal fluency. Semantic verbal fluency was shown to be dependent on intact left- and right-hemispheres, while phonemic fluency was only dependent on an intact left hemisphere. Similarly, switching strategies were impacted only by left hemispherectomy, while cluster size was relatively preserved regardless of the hemisphere lost. Together these results indicate some components of verbal fluency are more lateralized (i.e. phonemic total words, switching) while others are dependent on both hemispheres (i.e. semantic total words).

Correspondence: *Nicole Haugrud, 2 410 Keevil Crescent, Saskatoon, SK S7N 4R6, Canada. E-mail: nicole.haugrud@usask.ca*

### C. ITOI. Individual variations of cerebral dominance: language and emotional functions might be coexisting in same hemisphere.

**Objective:** Little is known concerning the effects of the individual differences in lateralization on the emotional processing. In this study we examined the individual variations in cerebral dominances of language and emotional functions using the dichotic listening test (DLT).

**Participants and Methods:** We developed a combined DLT method according with Bryden and Macrae (1989). The stimuli were composed of combined emotional prosody and single word. The participants were 49 Japanese university students. The subjects were asked to detect the target emotion or the target word separately.

**Results:** In the right handed group (n=43), the results showed that as a whole right ear advantage in the word condition and left ear advantage in the emotion condition. The subjects who showed right ear advantage (REA) for verbal stimuli were 63 percent and left ear advantage (LEA) for emotional stimuli were also 63 percent. However, the subjects who showed typical pattern, that is REA for verbal and LEA for emotional, were only 42 percent.

**Conclusions:** Our results imply that language and emotional processing were lateralized in each hemisphere as a whole, however these processing might be coexist in same hemisphere in individual level.

Correspondence: *Chihiro Itoi, Professional, Chuo University, Tokyo hachioji hirayama5-47-1-203, Tokyo 192-0393, Japan. E-mail: ichigodecember@yahoo.co.jp*

### S. IWABUCHI & I.J. KIRK. Distinctly Lateralised Networks for Verbal and Spatial Working Memory.

**Objective:** Working memory refers to the ability to temporarily maintain and manipulate information. Numerous functional imaging studies have reported a hemispheric organisation of the fronto-parietal working memory network that is dependent on the nature of the information (i.e. spatial or verbal stimuli). However, few studies have directly linked these functional asymmetries to structural asymmetries. Using both functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI), we investigated the connectivity between functionally defined regions involved in the processing of verbal and spatial working memory.

**Participants and Methods:** Nine healthy right-handed participants completed a spatial and verbal 2-back task during fMRI and also underwent DTI. Participants were presented with 3-letter consonant-vowel-consonant words that could appear in one of eight locations, and instructed to memorise either the location or word. Both tasks showed regions of peak activation bilaterally in the frontal and parietal regions. These were used to create seed regions of interests (two in each hemisphere) in order to track probabilistic pathways within each hemisphere for both tasks. Pathways which were present in at least 30% of participants were masked onto each individual's fractional anisotropy (FA) maps to derive FA values.

**Results:** Results showed a greater FA in the right hemisphere than the left for the spatial working memory network only. However, laterality indices of FA significantly differed between spatial and verbal working memory, revealing a rightward asymmetry for spatial working memory and leftward asymmetry for verbal working memory.

**Conclusions:** These results are consistent with left-hemispheric language processes and right-hemispheric visuospatial functions. This may suggest that there are distinct fronto-parietal working memory networks for maintaining spatial and verbal information.

Correspondence: *Sarina Iwabuchi, University of Auckland, Research Centre for Cognitive Neuroscience, Department of Psychology, University of Auckland, Private Bag 92019 Auckland Mail Centre, Auckland 1142, New Zealand. E-mail: sarinaiwabuchi@gmail.com*

### V. SIFFREDI, M. SPENCER-SMITH, V. ANDERSON & R. LEVENTER. Neuropsychological Profile of Agenesis of the Corpus Callosum – A Systematic Review.

**Objective:** Developmental absence (agenesis) of the corpus callosum (ACC) is a common brain malformation that may present in isolation or in association with other diseases. Variability in aspects of neuropsychological functioning has been reported in these patients. The aim of this study was to conduct a systematic review of the literature to characterise the profile of neuropsychological functioning in patients with ACC.

**Participants and Methods:** A systematic review of the literature was conducted using electronic databases and broad keyword searches. The searches were restricted to English-language publications in peer-reviewed journals that were published from January 1980 to January 2011. We included studies that focused on individuals diagnosed with ACC via MRI and reported performance scores on neuropsychological tests.

**Results:** There was variation in neuropsychological presentation reported in studies of patients with ACC. Impairments were observed in all domains examined. Intellectual abilities ranged from 'Extremely Low' to 'Average'. Impairment in processing speed was typical. Problems in visuo-spatial skills, language, attention and executive functions were less generalised. Memory and academic abilities were often intact, although patients typically displayed difficulties in mathematics. Neuropsychological outcomes may be associated with the age of patient at assessment, MRI features (e.g., partial or complete ACC, other pathology), medical and genetic factors (e.g., seizures, syndromes).

**Conclusions:** Based on limited research this systematic review suggests that patients with ACC demonstrate problems in neuropsychological functioning, with greatest difficulties in processing speed. Memory skills and some academic abilities remain relatively intact.

Correspondence: *Vanessa Siffredi, Master in Psychology, The Murdoch Childrens Research Institute, 369 Royal Parade, Parkville, VIC 3052, Australia. E-mail: vanessa.siffredi@gmail.com*

## HIV/AIDS/Infectious Disease

### M. ENNOK, L. SABRE & M. BRASCHINSKY. Neuropsychological Features in Advanced Dementia due to Neurosyphilis: A Case Report.

**Objective:** Neurosyphilis in Western countries is a rare disease. Recent increase in incidence is associated with HIV infection. We present a case of a HIV-negative patient with neurosyphilis.

**Participants and Methods:** A 42-year old previously healthy male was admitted to hospital due to an approximate one-year history of progressive cognitive decline, confusion, infrequent hallucinations, imbalance, gait disturbance, weakness of the left extremities and involuntary movements. The patient received a comprehensive neuropsychological assessment including tests of general intelligence, attention, learning and memory, executive functions and motor abilities.

**Results:** Neurosyphilis was diagnosed by serum and cerebrospinal fluid nontreponemal and treponemal tests, other causes were excluded by appropriate investigations. The patient exhibited a marked decline in all cognitive domains. Mini Mental State Examination score was 13. He had severe deficits in attention and memory tasks and prominent dysexecutive features. His thinking was governed by concrete associations and he presented frequent stuck-in-set type perseverations that were observed across different tasks. Manual motor movements were very restricted, apraxic and he was unable to perform most of the performance tasks.

**Conclusions:** Neurosyphilis is an uncommon cause of dementia. In our patient the symptoms included general decline in all cognitive domains and motor deficits in addition to behavioral problems. Despite its low occurrence neurosyphilis remains an important consideration of diagnosis in fast progressing cognitive decline in younger subjects because the disorder is treatable and cognitive symptoms associated with it are potentially reversible.

Correspondence: *Margus Ennok, MSc, Department of Neurology and Neurosurgery, University of Tartu, L. Puusepa 8, Tartu 51014, Estonia. E-mail: margus.ennok@ut.ee*

## Language and Speech Functions/Aphasia

### L.A. FOGG, A. TALMAGE & S. PURDY. Community Choirs for People with Brain Disease: Social Singing or Potential Therapy?

**Objective:** Singing in a group has been shown to improve quality of life, social connectedness and boost mood (Clift & Hancox, 2007, 2010). For people with communication difficulties through brain disease, singing is being investigated as a potential therapy. Di Benedetto et al (2009) propose choral therapy for people with Parkinson's disease, while Schlaug et al (2008) postulate that singing encourages neural plasticity in non-fluent aphasia. For this study, the authors explored the potential benefits of mixed choral singing for people with brain disease, examining both social and rehabilitative therapeutic aspects.

**Participants and Methods:** The CeleBRation Choir is a community music therapy group in Auckland, for people with brain disease and their carers, the first of its type in New Zealand. Participants have communication difficulties through stroke, Parkinson's disease, Alzheimer's disease and autism. Using a cross-sectional questionnaire, twelve members of the CeleBRation Choir rated the perceived values of each aspect using Likert scales and partially closed questions.

**Results:** Attitude scales were quantitatively analysed; high ratings were given to both social and rehabilitative aspects. Building new friendships, feeling supported by others and a boosted mood were all rated highly. However physical attributes such as improved posture, breathing, louder speaking and memory were also rated highly. Comments included "Enriched my life", "As a weapon to combat Parkinson's Disease effect on voice box" and "Improved speaking and posture".

**Conclusions:** The CeleBRation Choir offers choir sessions where social and rehabilitation goals overlap and it appears to impact on both aspects. Further research using a controlled trial design and a larger sample will better establish the benefits of choral singing for people with brain disease.

Correspondence: *Laura A. Fogg, BSc(Hons) PGDipBJ, Centre for Brain Research, University of Auckland, 85 Park Road, Grafton, Auckland 1142, New Zealand. E-mail: l.fogg@auckland.ac.nz*

### F. MONTEIRO, L.J. VAZ, R. STROBILIUS, S. BOLOGNANI & O.F. BUENO. Executive functions in aphasic patients: a preliminary study.

**Objective:** Investigating the interconnection of cognitive domains, several questions arise about the handling of executive functions and language, focusing on the cooperation between the two systems. Aphasia is a complex pathology of language that presents a significant deficit in verbal short-term memory and has contributed to the understanding of this cognitive network. In this study we investigated executive function performance in aphasic patient.

**Participants and Methods:** 52 right-handed subjects matched for gender, age and education were divided into two groups: G1 with 26 aphasic patients with lesions in the left hemisphere and G2 with 26 healthy subjects. The G1 was diagnosed by language evaluation, and both were submitted a neuropsychological battery with the following tests of executive functions: digit forward and backward (WAIS III), COWA, category animals; block design (WAIS III), Corsi block forward and backward, trail making A and B; tower of London; symbol search (WAIS III); and counting span.

**Results:** Aphasic patients had poor performance on digits forward and backward, Corsi blocks (backward), COWA, category animals, block design, symbol search, counting span, trail making A and B form and tower of London. There were no differences between groups G1 and G2 in the Corsi blocks (forward) and in the total score of the Tower of London. Aphasic patients show cognitive impairments beyond language, including non-verbal test.

**Conclusions:** Executive functions have an intrinsic process of collaboration in the fields of memory and language. The damage in this complex network at several levels affects cognitive executive function in aphasia.

Correspondence: *Fatima Monteiro, Master Student, Psychobiology, UNIFESP, Embau 54, São Paulo 04039-060, Brazil. E-mail: monteirofatima2005@yahoo.com.br*

### E. OFEK, S.C. PURDY, G. FRITSCH, C. MCCANN, T. WEBSTER, A. MILES & G. ALI. Neural Processing of Emotional Words in Aphasia Using EEG and Related Therapy.

**Objective:** To examine innovative diagnostic and therapeutic approaches in people with post-stroke aphasia (PWA), using event related potentials (ERP) to emotional words.

**Participants and Methods:** Eleven PWA and eleven matched controls participated in the study. Dense EEG was measured in response to emotional and neutral words. Potential emotional words were selected through a pre-study interview. An emotional score was given to each word using a post-study validated questionnaire. ERPs were averaged separately for (i) each word, (ii) each participant, (iii) groups of emotional and neutral words (iv) PWA and controls. sLORETA was used to localize underlying brain areas. Reminiscence-style therapy using emotional words chosen based on their brain responses was used in a participant with aphasia. Brain activity and language assessment scores were measured before and after therapy.

**Results:** Smaller N1 amplitude and longer P2 latency were found for PWA. Differential patterns were found for personal emotional and neutral words. Statistically significant changes were found post therapy, with improved communication and language skills, enlarged N1 amplitude and enhanced activity in the prefrontal cortex. Significantly enhanced activity was also found for neutral words not used in therapy.

**Conclusions:** Distinctive brain activity patterns were found in PWA. Preliminary results indicate the viability of a newly designed brain based therapeutic approach affecting brain plasticity in a person with aphasia. Further research will establish the feasibility of new targeted ERP-based diagnostic and therapeutic tools based on emotional word processing for people with brain disorders.

Correspondence: *Einat Ofek, PhD, Psychology, The University of Auckland, Speech science, Tamaki campus, building 721, The university of Auckland, Private Bag 92019, Auckland 1142, New Zealand. E-mail: ofek.einat@gmail.com*

## Imaging (Functional)

### M. MIYAHARA, R. KITADA, A. SASAKI, Y. OKAMOTO, H.C. TANABE & N. SADATO. From Gestures to Words: Verbal labelling of hand movements reduces activation of the inferior frontal gyrus.

**Objective:** Verbal labeling (VL) is known as an efficient mnemonic for visuospatial working memory. However, little is known about the neuronal basis of the process. This study aimed to identify the neural substrates involved in the effect of VL on increasingly complex sequential memory for hand movements.

**Participants and Methods:** We used fMRI to test our hypothesis that VL would keep neuronal activation in motor-related regions constant for the memory, regardless of movement complexity. Sixteen young healthy adults performed an immediate imitation task, a modified version of the Kaufman Hand Movement test (Kaufman & Kaufman, 1983) consisting of six levels of increasingly complex movements. After the fMRI experiment, the subjects reported in which complexity level they had formed verbal labels. Based on the report, we classified individual conditions into with VL (VL+) or without VL (VL-) at each complexity level.

**Results:** As compared to VL+ condition, VL- condition activated the inferior frontal gyrus, middle frontal gyrus, precentral gyrus and angular gyrus, whereas the opposite contrast produced no significant brain regions. Within the brain regions activated by VL- condition relative to VL+ condition, there was increasing activity with progressive complexity in the inferior frontal gyrus under VL- condition, whereas in the VL+ condition, the activity of the same regions was constantly low, regardless of movement complexity.

**Conclusions:** VL is an efficient heuristic, reducing the cost of cortical activation in the inferior frontal gyrus.



Correspondence: *Motohide Miyahara, Ph.D., University of Otago, School of Physical Education, University of Otago, PO Box 56, Dunedin 9054, New Zealand. E-mail: motohide.miyahara@otago.ac.nz*

**I. SZATKOWSKA, L. GAWRYS, M. FALKIEWICZ, A. PILACINSKI, E. PIATKOWSKA-JANKO, T. WOLAK, R. ANDRYSIAK, R. KULINSKI, A. FRIEDMAN, L. KROLICKI & L. KACZMAREK. Neural Bases of Executive Dysfunction in Parkinson's Disease: Identifying Brain Areas Involved in Minimally Sufficient and Rate-Limiting Processes Using Functional Magnetic Resonance Imaging.**

**Objective:** Functional anatomy of cognitive deficits in Parkinson's disease (PD) is not well understood. The aim of the present study was to delineate neural bases of cognitive impairments in PD using blood oxygen level-dependent (BOLD) functional magnetic resonance imaging (fMRI).

**Participants and Methods:** Twenty-six volunteers with idiopathic PD and 16 control subjects (C group) accomplished standard clinical measures of executive function (WCST, TMT, Digit Span and Stroop Tests), and then underwent fMRI investigation during performance of the n-back working memory task. We examined results from both standard group analyses and individual-differences-based analyses, which identified minimally sufficient and rate-limiting brain areas, respectively.

**Results:** Based on the neuropsychological data, PD patients were divided into two groups: those without (PD-), and with (PD+) executive function impairment. Between-group contrasts revealed that groups without cognitive impairments (C and PD-) displayed higher BOLD signal intensity within the precuneus in the left hemisphere, as compared to patients with deficits (PD+). Next, across individuals, correlations between executive function level and BOLD signal intensity were performed. They revealed positive relation within inferior frontal gyrus, inferior parietal gyrus, and caudate nucleus – areas known to be involved in working memory and executive functions, and negative relations within medial temporal lobes – brain regions essential for episodic memory processes.

**Conclusions:** Our results show that the left precuneus includes minimally sufficient area for executive function in PD, whereas both executive function network and episodic memory network include rate-limiting regions. Additionally, the results suggest that the standard group-analysis approach and the individual-differences approach should be used in conjunction, because they reveal complementary findings. This work was supported by a grant (NN402457138) from the Polish Ministry of Science and Higher Education.

Correspondence: *Iwona Szatkowska, Department of Neurophysiology, Nencki Institute of Experimental Biology, 3 Pasteur Street, Warsaw 02-093, Poland. E-mail: i.szatkowska@nencki.gov.pl*

**V. VAN MULUKOM, R.P. ROBERTS, D.L. SCHACTER, M.C. CORBALLIS & D. ADDIS. Hippocampal and Amygdalar Connectivity During Simulation of Novel Future Events.**

**Objective:** Although a common core network is engaged for remembering the past and imagining the future, the right hippocampus (RHC) is differentially active for imagining relative to remembering. In a recent fMRI study, our univariate analyses revealed that not only is the RHC responsive to the novelty of future events, but also the right amygdala – a region not previously shown to be active during future simulation. This current multivariate analysis examined the connectivity between these two regions and the rest of the core network, with the objective of better characterizing the amygdala activity and its relationship to the RHC.

**Participants and Methods:** Participants (N=20) generated 90 past events in a pre-scan interview, identifying a unique person, object and location in each. During scanning, these details were randomly rearranged into novel combinations and participants imagined future events incorporating the details. They then re-imagined the same event twice more, resulting in novel ("First") and repeated ("Third") imaginings of the same future event. Activity during these two conditions was extracted from RHC and right amygdala and entered as seeds into a multivariate Partial Least Squares (PLS) analysis.

**Results:** The PLS seed analysis resulted in one significant latent variable that indicated strong functional connectivity between the RHC and

amygdala seeds during both the First and Third conditions. Furthermore, both seed regions exhibited similar connectivity with other regions in the core network, including left hippocampus, amygdala and inferior frontal gyrus, and bilateral parahippocampal and fusiform cortex.

**Conclusions:** The PLS analysis revealed that the RHC and amygdala are strongly connected with each other as well as to the same regions of the core network, and this connectivity tracks across event repetitions. This result suggests that these two regions work together as a functional unit when constructing novel future simulations.

Correspondence: *Valerie van Mulukom, PhD candidate, University of Auckland, Dept of Psychology, P.O. Box 68282, Newton, Auckland 1145, New Zealand. E-mail: vvanmulukom@gmail.com*

## MCI

**S. FERNÁNDEZ-GUINEA, M. DELGADO, A. FRANK, M. GARCÍA, S. NIETO, L. ZALDUNBIDE & D. OVIEDO. RECOVERY VERSUS RECOGNITION IN AGING, MILD COGNITIVE DETERIORATION AND ALZHEIMER'S DISEASE.**

**Objective:** There is scientific evidence about differences in coding and consolidate information among elderly, mild cognitive impairment and Alzheimer's disease people. It is well known that semantic cues could facilitate consolidation and recovery of information. However, there are few studies about verbal recognition process and variables affecting differently to these three groups. It is hypothesized that semantic cues could produce diverse benefits among these groups and could mediate recognition performance.

**Participants and Methods:** The study involved 120 volunteers older than 65 years, both genders, classified into three groups: 40 healthy elderly, 40 with MCI and 40 with mild EA. The following tests were applied: Mini Mental State Examination, Geriatric Depression Scale, CDR criteria, Dementia Blessed Scale, and a Spanish version of CVLT.

**Results:** Statistical analysis (ANOVA) showed that there are significant differences among three groups in learning (A1, F=38.26, p<0.000; A5, F=75.66, p<0.000; ATF=126.32, p<0.000) and consolidation measures (STM, F=23.71, p<0.000; LTM, F=95.86, p<0.000). In all cases AD group showed poorer performance than MCI group, and this one poorer performance than NA group. However, in recognition measures, there are significant differences between NA and AD group (p<0.000), and between MCI group and AD group (p<0.000), but not between NA and MCI group. A qualitative analysis showed that there are differences among three groups in semantic cues benefits at short and long terms.

**Conclusions:** Semantic cues benefits could explain differences in recovery and recognition performance among NA, MCI and AD groups in verbal learning and memory.

Correspondence: *Sara Fernández-Guinea, Ph.D., Psicología Básica II (Procesos Cognitivos), Universidad Complutense de Madrid, Facultad de Psicología, Madrid 28223, Spain. E-mail: sarafguinea@yahoo.com*

## Memory Functions

**P.N. BULL, E.A. KENSINGER & D. ADDIS. Type of Recognition Test May Influence the Relative Contributions of Familiarity and Recollection When Recognizing Emotional Visual Images.**

**Objective:** Familiarity and recollection appear to be distinct memory processes. Assessment of deficits to these memory processes critically depends on the ability of memory tests, such as single-item tasks and forced choice recognition, to distinguish between familiarity and recollection. There is debate as to whether forced-choice recognition relies primarily on familiarity or recollection. Our study investigated whether a recollection effect demonstrated previously on a single-item task would generalize to a forced-choice task. Kensinger and Choi (2009) had found that recollection of negative images was superior to that of neutral or positive images when presented to the right hemisphere. We modified their procedure to use a forced-choice recognition test.

**Participants and Methods:** Twenty-four young adults viewed a series of 450 images, each showing an object of either negative, neutral, or positive emotional valence. Each image was briefly presented to the left or right visual field while participants maintained a central fixation. A surprise four-alternative forced-choice memory test followed.

**Results:** Contrary to the findings of Kensinger and Choi, no significant recollection advantage was found for negative images presented to either hemisphere. However, reaction time data indicated that cognitive processing for negative images was significantly slower relative to positive and neutral items.

**Conclusions:** A growing literature suggests that single-item tasks such as the same/similar/new procedure can probe recollection, but that forced-choice tests may rely more on familiarity. Our results also suggest this may be the case; memory for negatively-valenced objects was not enhanced using a forced-choice recognition test, despite previous findings of a recollection effect on single-item task. We conclude that further work is needed to clarify the interaction between task type and recognition process.

Correspondence: Peter N. Bull, BSc, Psychology, University of Auckland, 2/60 Waiau St, Torbay, Auckland 0630, New Zealand. E-mail: pbu005@aucklanduni.ac.nz

### S. BAYLAN & J.J. EVANS. **Oops, It Slipped My Mind: Improving the Assessment of Prospective Memory Using Two-Phase Computerised Tasks.**

**Objective:** Forgetting appointments, important occasions, or failing to carry out promises made to friends, can have a disabling effect on an individual's social functioning. These tasks require prospective memory (PM) – the ability to remember to carry out intended actions. PM tasks cannot be completed immediately but incorporate a delay filled with other unrelated activities. Deficits in PM are common following neurological illness. Tasks used to study cognitive processes involved in PM typically involve performing an ongoing task into which PM targets are embedded. Such tasks often have a relatively high frequency of PM targets, which may prompt higher levels of attention and monitoring than is likely in real life situations and therefore may not provide an accurate measure of the likelihood of everyday PM errors. The present study investigated PM performance on tasks designed to reflect more accurately the attentional demands of everyday life.

**Participants and Methods:** Twenty healthy subjects completed two computerised tasks involving a background (ongoing) task, into which PM targets were embedded. The tasks have two phases with a break between phases during which participants were asked to carry out an unrelated task for 30 seconds before continuing the previous task. Performance differences between phase 1 and phase 2 were examined for both PM and ongoing tasks targets.

**Results:** Significant ( $t = 2.12$  (19),  $p < .05$ ) reduction in PM target accuracy, averaged across tasks, was seen from phase 1 (65%) to phase 2 (50%) whilst performance on ongoing task targets remained unchanged ( $t = -.96$  (19),  $p = .35$ ) indicating that the PM finding was not due to general reduction in attention.

**Conclusions:** PM tasks involving a delay between phases during which an unrelated task is performed may provide a better and more life-like measure of PM ability and may also make the tasks more suited for assessing the effects of cognitive rehabilitation interventions aimed at improving PM.

Correspondence: Jonathan J. Evans, PhD, Mental Health & Wellbeing, University of Glasgow, Academic Unit, Gartnavel Royal Hospital, 1055 Great Western Road, Glasgow G12 0XH, United Kingdom. E-mail: jonathan.evans@glasgow.ac.uk

### T. HATTA, A. IWAHARA, K. YOSHIKAWA, T. HATTA & J. HATTA. **Handedness difference in direction memory: A neuropsychological model.**

**Objective:** The purpose of this study was first to demonstrate handedness difference in memory recall errors to familiar items such as kitchenware and stationary containing directional information and second to propose a neuropsychological model to interpret why and how the directional errors are produced.

**Participants and Methods:** Participants were 20 left-handers, 20 ambidextrous and 20 right-handers. They were given photos of kitchenware and stationary containing left or right directional information and recalled these items and their direction after 60 min. later.

**Results:** Results of direction of recall was generally poor and the right-handers made more error to the items of rightward direction, whereas the left-handers and ambidextrous made more errors to leftward direction.

**Conclusions:** To interpret the reason why handedness bias was shown in left/right direction, a neuropsychological new model was proposed.

The model involves two system, basal ganglia-based and limbic system-based, and when memory recall of the directional item, both systems automatically activate habitual motor system with direction and these supra-modal coincidental neural network activation invites confusion and error response.

Correspondence: Takeshi Hatta, Ph.D., Health Psychology, Kansai University of Welfare Sciences, School of Health Sciences, 3-11-1, Kashiwara 582-0026, Japan. E-mail: hatta@fukusi-kagk-u.ac.jp

### M. MATSUI, A. MIYAZAKI & H. NISHIJO. **Selection of memory strategy and brain activity during metamemory process : a near-infrared spectroscopy study.**

**Objective:** Metamemory refers to knowledge and monitoring of our own memory. This evaluation can be measured by a judgment of learning (JOL), which is a subjective judgment regarding our confidence in whether a learned item will be remembered in the future. We examined the effects on people's judgments of learning of a different kind of relatedness, which occurs in a list organized into sets of categorically related words and unrelated words. Then, we investigated how metamemory is involved in memory strategy. Furthermore, we examined the hypothesis of neural mechanism that the frontal cortex is critically involved in monitoring and control processes, which are central components of metamemory.

**Participants and Methods:** Participants were thirteen healthy adults, and were instructed to memorize a list of words consisted of four exemplars from each of four categories (categorical list condition) or a list of unrelated words (unrelated list condition). The JOLs were made immediately after each learning. During the words learning and JOLs, we also measured oxygenated hemoglobin changes [oxyHb] using the near-infrared spectroscopy (NIRS).

**Results:** The results showed that JOL would be more accurate in the categorical list condition compared with the unrelated list condition, and categorization in memory strategy would be more used in the categorical list condition rather than the unrelated list condition. The results of NIRS showed that [oxyHb] changes in dorsolateral prefrontal area were more increased in the categorical list condition rather than the unrelated list condition, while [oxyHb] changes in medial prefrontal area were more increased in the unrelated list condition rather than the categorical list condition.

**Conclusions:** These findings demonstrate metamemory is involved in an efficient memory strategy and distinct neural mechanisms supporting metamemory processes. It suggests that dorsolateral prefrontal area plays an important role in cognitive control, while medial prefrontal area does it in cognitive monitoring.

Correspondence: Mie Matsui, Ph.D., University of Toyama, 2630 Sugitani, Toyama 930-0194, Japan. E-mail: mmatsui@las.u-toyama.ac.jp

### K.A. MCCORMICK, J.A. SEARLE & D. ADDIS. **The Influence of Visual/Verbal Abilities and List Concreteness on Susceptibility to False Memories.**

**Objective:** Visual abilities and imagery strategies reduce susceptibility to false memory (FM) on the Deese-Rodeiger-McDermott (DRM) paradigm by increasing the visual distinctiveness of list words. Similarly DRM lists with concrete words that facilitate imagery also reduce FM. However in previous studies, lists differing in concreteness also differed in backward associative strength (BAS), and no study has examined whether the concreteness effect is modulated by visual abilities.

**Participants and Methods:** Six concrete and six abstract DRM lists were identified using MRC Psycholinguistic concreteness ratings. Importantly, these lists did not differ in BAS. Participants (N=31) completed the DRM and WAIS-III and WMS-III subtests probing visual (Block Design, Visual Reproduction) or verbal (Vocabulary, Logical Memory) abilities. Individuals whose average visual and verbal scaled scores differed by more than 1 standard deviation were classified as having a strength in one area.

**Results:** The visual group (N=11) had fewer FMs than verbal individuals (N=5); this advantage was evident on both concrete and abstract lists. Moreover, visual individuals had fewer FMs on concrete than abstract lists. For verbal individuals, however, rates of FM did not differ according to list concreteness. Regressions showed that visual ability

predicted fewer concrete FMs, while gist ability predicted more concrete and abstract FMs. All verbal individuals reported using a gist strategy whereas 55% of visual individuals used an imagery strategy. Across the full sample, subjects using a gist strategy had higher FM rates than those using a visual strategy.

**Conclusions:** We found that concreteness influences FM rates, but only in visual individuals who are more likely to use a visual strategy. Moreover, verbal abilities and gist strategies increase FM rates for both concrete and abstract lists. These findings suggest that both visual and verbal abilities are important influences on susceptibility to FM.

Correspondence: *Jordan A. Searle, Psychology, University of Auckland, 26 Wynyard Road, Mt Eden, Auckland 1024, New Zealand. E-mail: jsca025@aucklanduni.ac.nz*

#### **G.B. SCHEIBNER & J.M. LEATHEM. Everyday Forgetfulness and Memory Strategy Use: The Effects of Memory Goal Importance.**

**Objective:** Despite laboratory evidence for the value of memory goals, little is known about the effects of memory goals in the context of everyday life. The current study set out to answer a number of questions regarding memory goals in everyday life. The following hypotheses were tested:

H1: Individuals who rate common everyday memory goals as more important will report higher levels of memory strategy usage.

H2: Higher levels of forgetfulness lead to higher levels of goal importance ratings.

H3: Older people are more likely to report higher levels of goal importance ratings.

**Participants and Methods:** 409 members of the general population of New Zealanders (241 females and 168 males) took part in this online survey. Quantitative data analyses were used to test the hypotheses.

**Results:** H1: Results indicate no interaction between levels of goal importance and forgetfulness. However, significant main effects were obtained for both goal importance and forgetfulness. In support of H1, the main effect for goals indicates that those who rate their goals as more important are more likely to apply memory strategies.

H2: Pairwise comparisons indicated that goal importance ratings for individuals in the lowest level of forgetfulness differed significantly from both medium and high levels of forgetfulness, and medium and high levels of forgetfulness were also found to differ significantly. These data support H2.

H3: Results indicate no interaction between levels of goal importance and age-group. The main effect for age group was also non significant. Hypothesis 3 is not supported by the current data.

**Conclusions:** The findings provide valuable information about memory goals in everyday life. Memory improvement programmes may usefully integrate memory goal setting into their curriculum as goals that are important to individuals may lead to increased strategy usage and ultimately fewer instances of forgetting.

Correspondence: *Gunnar B. Scheibner, Psychology, Massey Wellington, 24 King Street, Wellington 6011, New Zealand. E-mail: gunnar.scheibner@gmail.com*

#### **K.J. VEARNCOMBE, G.J. BYRNE, J. WILSON, C. TILSE, D. PINSKER & N.A. PACHANA. The Impact of Anxiety vs. Memory Impairment on the Assessment of Financial Capacity: Two Case Studies.**

**Objective:** Financial management is a complex instrumental activity of daily living that impacts on a person's independence and quality of life. However, factors influencing financial management abilities have been largely ignored in the research literature. We thus present two cases illustrating the impact of cognitive difficulties and anxiety on financial capacity.

**Participants and Methods:** Participants were two women – one diagnosed with agoraphobia (S.C.) and one experiencing significant memory difficulties (R.K.). Neuropsychological assessment included the Financial Competence Assessment Inventory (FCAI), Addenbrooke's Cognitive Examination (ACE-R), and mood measures (GDS and GAI). Informant measures included assessment of activities of daily living, mood and social vulnerability.

**Results:** As expected, S.C.'s performance on anxiety measures indicated significant anxiety (GAI=13) and normal cognitive ability (ACE-R=92), while R.K. scored within normal limits on anxiety measures (GAI=0)

and significantly below normal on cognitive measures (ACE-R=75). Mild rates of depression were reported in both cases, and both participants were perceived to be equally vulnerable by informants. Performance on the FCAI showed that S.C.'s financial abilities all fell within the average range, while R.K. performed in the significantly impaired range in most domains, including everyday financial abilities, financial judgement, estate management, and support resources.

**Conclusions:** Significant anxiety symptoms alone are unlikely to influence financial management skills, while memory difficulties significantly and adversely affect financial capacity. Moreover, accurately gauging the impacts of psychological and cognitive distress on aspects of financial capacity are often difficult for significant others to judge and emphasise the need for objective functional tests to supplement informant reports.

Correspondence: *Katharine J. Vearncombe, PhD, Psychology, University of Queensland, 50 Tucker St, Chapel Hill, Brisbane, QLD 4069, Australia. E-mail: k.vearncombe@psy.uq.edu.au*

### **Medical/Neurological Disorders/Other (Child)**

#### **C. NAGAI, T. INUI & M. IWATA. Closing-in phenomenon during line-by-line figure copying in Williams syndrome.**

**Objective:** The closing-in phenomenon (CIP) during figure copying, defined as drawing near a model figure, is observed in normally developing preschoolers and brain damaged patients. The purpose of this study was to determine whether the CIP in individuals with Williams syndrome would be different from normally developing children, particularly when the stroke order was presented.

**Participants and Methods:** Ten individuals with Williams syndrome (WS, 18 years; mean IQ, 46) and 20 normally developing children (4 years, NC4; 5 years, NC5; 6 years, NC6) participated in the study. The assessment included the Bender Gestalt Test (BGT) and a novel figure copying task, Line-by-line Copying (LBLEC). In the LBLEC, six closed figures were used. Subjects were shown a figure line-by-line to indicate the stroke order on the left half of a PC display and copied the figure on the right. Scores and the distance between the far left of the model and the drawn figure (DFL), which was used as an indicator of the degree of CIP, were analyzed.

**Results:** 1) BGT: The mean score in WS was poorer than that in NC5/6 ( $p < .001$ ,  $p = .015$ ) and comparable to that in NC4. 2) LBLEC: The mean score in WS did not show any difference between all groups. The mean DFL in WS was significantly smaller than the other groups (NC4,  $p = .015$ ; NC5/6,  $p < .001$ ). The mean DFL in WS and NC4 did not show any difference among the six figures. Conversely, DFL in NC5/6 showed difference among the figures. The correlation analysis revealed that the DFL correlated with age in NC ( $p = .047$ ,  $r = .182$ ) and with score in WS ( $p = .026$ ,  $r = .273$ ).

**Conclusions:** Although copying abilities in WS relatively improved by showing stroke order, a CIP is induced concurrently, regardless of the figure. Conversely, the CIP in NC decreases in proportion to the chronological age, even with a stroke order, and figure types inducing CIP are clearer in older children. These results suggest that stroke order presentation may induce CIP in WS differently than in NC.

Correspondence: *Chiyoko Nagai, ERATO, JST, S9-3 Kitashirakawa Oiwake-cho, Sakyo-ku, Kyoto, Kyoto 606-8224, Japan. E-mail: nagai@jeap.org*

### **Medical/Neurological Disorders/Other (Adult)**

#### **M. HO, K. HUANG, W. CHEN, C. HSU, T. LEE, H. LIU & S. RYU. The Neuropsychological Performance of Unilateral Carotid Artery Stenosis: A Preliminary Study.**

**Objective:** It is believed that carotid artery stenosis can lead to cognitive impairments secondary to thromboembolism or hypoperfusion. However, very few studies have examined if the ipsilateral effects of carotid stenosis on hemispheric functions can be substantiated by neuropsychological performance.

**Participants and Methods:** Sixty-nine patients with unilateral carotid stenosis (> 60%) and 34 volunteers (age:  $M = 61.12$ ,  $SD = 8.37$ ) participated the study. The patients were grouped to the left stenosis group

( $n = 35$ ; age:  $M = 67.71$ ,  $SD = 9.12$ ) and the right stenosis group ( $n = 35$ ; age:  $M = 64.53$ ,  $SD = 9.32$ ) based on the angiography. All participants underwent a neuropsychological battery entailing different specific cognitive domains, including general ability, memory, visuospatial functioning, and executive functions, etc. Using age and years of education as covariates, all the test scores were analyzed by ANCOVA or MANCOVA where appropriate.

**Results:** The performance of the left and right stenosis groups did not differ significantly on most neuropsychological measures. However, when comparing to the volunteers, the right stenosis group performed significantly worse on matrices reasoning,  $F(2, 96) = 3.79$ ,  $p = .026$ ; visuospatial functioning,  $F(2, 96) = 7.44$ ,  $p < .001$ ; and manual dexterity for the non-dominant hand,  $F(2, 39) = 11.89$ ,  $p < .001$ . In contrast, the left stenosis group performed significantly worse on the word-list learning,  $F(2, 88) = 5.50$ ,  $p = .006$ ; manual dexterity for the dominant hand,  $p < .001$ ; and category fluency,  $F(2, 95) = 3.69$ ,  $p = .029$ .

**Conclusions:** Our preliminary findings suggest carotid artery stenosis may compromise some neuropsychological functions, but it will only become evident when being in comparison with the controls. In general, it is difficult to differentiate patients with unilateral carotid stenosis by most neuropsychological measures.

Correspondence: *Meng-Yang Ho, PhD, Institute of Clinical Behavioral Sciences, Chang Gung University, 259, Wen Hwa 1st Road, Kwei Shan, Tao Yuan County 333, Taiwan. E-mail: myho@mail.cgu.edu.tw*

### G. LOWNDES. Financial Elder Abuse and Enduring Powers of Attorney - What Clinical Neuropsychologists should know.

**Objective:** Clinical Neuropsychologists are often asked to assess clients capacity to appoint an Enduring Powers of Attorney (Financial).

**Participants and Methods:** This talk will review recent research regarding the uptake of EPAs in the community and the use of these documents as a mechanism for financial abuse against older people.

**Results:** It will outline principals inherent within such appointments that neuropsychologists should be aware of.

**Conclusions:** Attendees will be more informed about EPAs and be better equipped to assess clients capacity to appoint EPAs as a result.

Correspondence: *Georgia Loundes, Monash, Bld 17, Monash Uni, Clayton, 3800, Clayton, VIC 3800, Australia. E-mail: georgia.loundes@monash.edu*

### K. MEATES & G. LOWNDES. Priming effects during paired associate learning could lead to overestimation of recognition memory.

**Objective:** This study investigated whether the delayed cued-recall trial in verbal paired associate learning (PAL) has a facilitatory priming effect on subsequent delayed recognition performance.

**Participants and Methods:** Thirty-two young adults completed two PAL tasks: a traditional task where delayed cued-recall precedes delayed recognition and a novel comparative task where delayed free-recall precedes delayed recognition.

**Results:** As hypothesised, performance on delayed recognition was significantly higher when preceded by a cued-recall test than a free-recall test,

suggesting delayed cued-recall in PAL has a facilitatory priming-like effect on delayed recognition performance.

**Conclusions:** This effect could result in overestimation of an individual's recognition memory capacity if performance on the delayed recognition trial was interpreted in isolation.

Correspondence: *Georgia Loundes, Monash, Bld 17, Monash Uni, Clayton, 3800, Clayton, VIC 3800, Australia. E-mail: georgia.loundes@monash.edu*

### E.I. ORLOWSKA. Broken bonds in aphasic couples.

**Objective:** Family relations and social performance are of essential importance in rehabilitation outcome. Therefore author tried to determine the characteristics and changes dynamics of marital quality in couples with a fluent and non-fluent after-stroke aphasic spouse

**Participants and Methods:** 60 couples with an after-stroke aphasic partner were recruited and divided into four groups equal in number (30 people): fluent aphasic patients (A), their spouses (B), non-fluent aphasic patients (C) and their spouses (D). Aphasia type and severity was assessed using standardized neuropsychological batteries, and marital quality of life using Dyadic Adjustment Scale (DAS Spanier). All subjects were approached twice: up to 7 days from aphasia prevalence and 6 months later.

**Results:** There were no significant differences between the groups in first evaluation. The U-Mann-Whitney test analysis in second assessment, proved that fluent aphasic patients evaluate general quality of marriage, marital satisfaction, marital harmony lower than non-fluent aphasic patients. Correspondingly fluent patients spouses estimate general quality of marriage, marital harmony coherence and emotional expression in relationships as lower in comparison to non-fluent patients spouses.

**Conclusions:** After 6 months from aphasia prevalence there are significant changes in the reported level of marital quality in many aspects particularly among the fluent aphasic patients and their life partners. Acquired results can contribute to the development of a group therapy program for couples hindered by aphasia, suited for their specific needs.

Correspondence: *Edyta I. Orłowska, doctor, Social Sciences Department, University of Gdańsk, Bałtyjskiego 4, Gdańsk 80-952, Poland. E-mail: psyeo@ug.edu.pl*

### M.A. WITKOWSKA. Prospective Memory Impairment in Chronic Pulmonary Diseases.

**Objective:** The efficiency of the respiratory system limits a good fitness and proper functioning of the brain. Respiratory failure is linked to ageing or chronic diseases such as asthma or chronic obstructive pulmonary disease. Decreased transportation of oxygen to the brain directly reduces mental efficiency, including memory and attention.

Prospective memory (PM) is a set of processes or abilities to formulate, store and implement the purposes and intents in a set time frame or situation. A person with a well functioning PM effectively uses a set of methods that leads him/her to success in the execution of its intent - enables the person to conduct an independent and fulfilled life.

**Participants and Methods:** The following methods were administered to adult patients with allergic rhinitis (AL,  $n=20$ ), asthma (AS,  $n=20$ ) and chronic obstructive pulmonary disease (COPD,  $n=20$ ): PRMQ, an quasi-experiment based on CAMPROMT, BDI, CFT and tests measuring executive functions and attention.

**Results:** COPD patients, compared to AS and AL patients, assess the functioning of their PM least accurately. Besides, COPD patients, compared to AL, are worse in both types of PM (time- and event-based PM). AS patients are better coping in time-based PM tests than in event-based PM tests (in the latter case, getting results similar to COPD patients). AL significantly differs from COPD and AS patients in terms of intensity of the depression. At the same time the self-assessment of the intensification of depression in COPD patients doesn't predicate the functioning of their memory.

**Conclusions:** The specificity of the disease affects the functioning of the PM - a linear relationship between respiratory efficiency and its impairment is noted. Depression is a fundamental feature of chronic pulmonary diseases, such as COPD and asthma. Unfortunately, the results lead to the conclusion that COPD patients may not deal with the prescribed therapeutic requirements because of their PM impairment and its inadequate self-assessment.

Correspondence: *Marta A. Witkowska, masters, University of Gdansk, Bazynskiego, 4, Gdansk 80-952, Poland. E-mail: marta.witkowska@ug.edu.pl*

## Stroke/Aneurysm

### D.H. BIECHOWSKA, K. JODZIO, E. SZUROWSKA & D. GASECKI. Inhibitory control dysfunction in stroke patients.

**Objective:** Neuropsychological consequences of a stroke include, inter alia, other executive dysfunctions, which cripple not only personality and emotional functioning, but also hinder cognitive performance and motor skills. The aim of this study is to evaluate prevalence, clinical characteristics and neuroimaging correlates of inhibitory control dysfunction of selected cognitive and motor functions after stroke.

**Participants and Methods:** Research involved evaluation of two groups of patients. The first group consisted of 65 patients who had suffered unilateral ischaemic stroke no earlier than 30 days prior to the commencement of the study. All subjects were selected on the basis of MRI and/or CT results and medical record. The control group was composed of 25 healthy subjects. Inhibitory control was measured with two widely used in clinical practice tasks: experimental version of the Stroop Color-Word Test (SCWT) and go/no-go task (GNG).

**Results:** Inhibitory control deficit was confirmed among 54 patients, i.e. 83% of whole clinical group. Those patients failed to solve one or more of the tasks (SCWT and/or GNG). Statistical analysis univariate repeated measures ANOVA with post hoc Tukey's test as comparison showed that patients with selective posterior lobe damage solved presented tasks as normal, similarly to the control group, and significantly better than patients frontal lobe (FRL) or subcortical (SUB) impairment. Moreover, only subjects with FRL or SUB received diagnostically lower scores in GNG than in SCWT.

**Conclusions:** Response inhibition deficits, i.e. verbal and motor response, is a very common post-stroke symptom. Character and severity of disinhibition symptoms varied across the group. The most severe were revealed in patients with damage to frontal lobe or subcortical, particularly striatum, thalamus and their cortical connections.

Correspondence: *Daria H. Biechowska, Institute of Psychology at University of Gdansk, Bazynskiego 4, Gdansk S0-952, Poland. E-mail: psydb@ug.edu.pl*

#### **K. FERRY, C. MCKEY, S. KENNEDY & L. SHAW. Community Rehabilitation Program - One Man's Journey.**

**Objective:** The Community Rehabilitation Program (CRP) provides a holistic service aligned with the ICF framework to enable clients presenting with an acquired brain injury to achieve the best possible outcomes in recovery. The following case study documents a client's journey through their rehabilitation program.

**Participants and Methods:** Mr B is a 40 year old male, premorbidly a high functioning successful business manager for a national organisation, who had sustained a left middle cerebral artery ischaemic CVA resulting in severe Broca's aphasia and a right sided hemiparesis. He commenced the CRP five weeks post event. Mr B identified 2 overarching goals:

1. To improve communication
2. To improve right upper limb function

A multidisciplinary approach was implemented to assist Mr B to achieve his specific goals. It was identified that there was a need for intensive intervention form primarily speech pathology and occupational therapy. The intensity of therapy was facilitated by the support of an allied health assistant, joint OT/PT group therapy, and psychological intervention via additional communication tasks. Pre and post measures included Western Aphasia Battery, Boston Naming Test, Upper Limb - ROM, Grip Strength and Coordination assessments. The WHOQoL Bref and Sydney Psychosocial Reintegration Scale were also completed

**Results:** Results are reported from Mr B's 14 weeks of participation in the program during which he received intensive individual and group based multidisciplinary rehabilitation. Mr B demonstrated considerable gains on assessment and outcome measures, and made significant progress.

**Conclusions:** The multidisciplinary approach to community based rehabilitation enabled varied opportunities for this particular client to practice techniques, work towards and ultimately achieve his personal and specific goals.

Correspondence: *Kim Ferry, MA(Clinical Neuropsychology), Queensland Health, Level 6 Zurich House, 8-10 Karp Court, Bundall, QLD 4217, Australia. E-mail: Kim\_Ferry@health.qld.gov.au*

#### **K. FERRY, P. MEPPEN, C. MCKEY & S. KENNEDY. Community Rehabilitation Program - A Multidisciplinary Model of Care for Community Based Rehabilitation.**

**Objective:** The Community Rehabilitation Program (CRP) commenced in the Gold Coast Health Service District in June 2010. The CRP was established to meet a gap in the health service delivery for young people with acquired brain injury. The CRP aims to provide a holistic service aligned with the ICF framework. It is a service focused upon improving client's community participation, functional capacity and optimising quality of life.

**Participants and Methods:** The program provides a goal orientated, time-limited, multidisciplinary rehabilitation service to clients aged between 18-60 years with a diagnosis of acquired brain injury. CRP takes a multidisciplinary approach from triage assessment, through goal setting, case conferencing, individual therapy and group programs. Therapy encompasses individual and group based interventions and includes both home and centre based activities. In order to quantify the impact of multidisciplinary service provision, client's quality of life was measured using the WHOQoL Bref and Sydney Psychosocial Reintegration Scale at the commencement of the program and upon discharge. Client rehabilitation goals were also measured on a 0-10 attainment scale.

**Results:** In the first four months of operation, the CRP has worked with 28 clients, 10 having completed the program. These clients set a combined total of 55 goals and achieved 85% (45), spent an average of 8.5 weeks participating in the program, and on discharge they demonstrated improvement across all domains of the WHOQoL Bref and SPRS. The average age of referred clients was 28years. The average number of disciplines involved in each client's rehabilitation was 3.5.

**Conclusions:** Although at an early stage of development the multidisciplinary approach maintained by the CRP is providing positive indications of meeting clients rehabilitation needs at the point of transition from hospital to community.

Correspondence: *Kim Ferry, MA(Clinical Neuropsychology), Queensland Health, Level 6 Zurich House, 8-10 Karp Court, Bundall, QLD 4217, Australia. E-mail: Kim\_Ferry@health.qld.gov.au*

#### **E. MORRISS. Behavioural and Personality Change Following Stroke: Developing Guidelines for Stroke Management.**

**Objective:** Stroke is a major cause of disability in Australia. Many people with stroke benefit from rehabilitation, but there has been little research or clinical focus on the personality and behavioural changes (irritability, aggression, emotional lability, social disinhibition, perseveration, adynamia) that impact on quality of life and social reintegration. The aim of this project was to inform development of National Stroke Foundation Guidelines for Stroke Management. These guidelines previously have not addressed personality and behavioural changes following stroke. It was anticipated that inclusion of information on behavioural and personality sequelae following stroke will enhance practitioner awareness and inform appropriate rehabilitation and the long-term support available to survivors and family/carers

**Participants and Methods:** A comprehensive literature review was completed with the purpose of understanding the current best practice evidence in respect of the prevalence, severity, and impact of behavioural and personality changes following stroke. This information was utilised to construct recommendations for management of behavioral and personality changes in a rehabilitation context.

**Results:** Guidelines for management of behavioural and personality changes following stroke are now included in the National Stroke Foundation Guidelines for Stroke Management

These guidelines have been approved by the NRMRC in August 2010, and will inform national clinical practice.

**Conclusions:** Personality and behavioural difficulties are common following stroke. Stroke survivors and their family and carers will benefit from education, support, and rehabilitation intervention to facilitate recovery and improved quality of life and coping. Further research should be completed to identify the specific interventions of most benefit.

Correspondence: *Elissa Morriss, Acquired Brain Injury Outreach Service, PO BOX 6053, Buranda, Brisbane, QLD 4102, Australia. E-mail: elissa\_morriss@health.qld.gov.au*

#### **H. VYKOPAL, S. BARKER-COLLO & V. FEIGIN. The Long-Term (5-Year) Outcomes of Primary Intracerebral Haemorrhage. A Population-Based Study.**

**Objective:** This study examines the long term neurological and neuropsychological, mood, ADLs and HRQoL outcomes of an ICH at a population level. In particular; progress of recovery over time, the impact of demographic variables and relationships between domains of outcomes are considered.

**Participants and Methods:** Nineteen participants were recruited from a population-based incidence study of stroke (ARCOS, 2003) of whom

77 had experienced an ICH. A healthy matched control group (matched for age, gender ethnicity and education) was also recruited. Both groups were examined on a series of measures considering neurological and neuropsychological functioning, mood, activities of daily living (ADLs), and health related quality of life (HRQoL). Data available on outcomes from the ARCOS study relating to function, mood and HRQoL (at 1 and 6 months post-ICH), was also used.

**Results:** Comparison of the performance of the control and ICH group, and the effects of demographic variables on performance, were examined using 1-way ANOVAs. Repeated measures ANOVAs were used to examine change over time in performance in the ICH group. Correlations were used to investigate relationships between outcomes in the ICH group.

**Conclusions:** At 5-years post ICH, survivors continued to experience impairment in neurological and neuropsychological functioning. They experienced more symptoms of depression and greater limitations in ADLs. HRQoL between the groups only differed when physical functioning had a role. Poorer neurological functioning was correlated with poorer information processing and greater overall cognitive impairment. In addition, poorer information processing speed and executive functioning were associated with reduced HRQoL. Those with depressed mood were more likely to have difficulties in ADLs and a poorer HRQoL. Education was associated with better overall cognitive function. From time of initial ICH to 5-years post, there was an improvement in engagement with ADLs, but no change in HRQoL.

Correspondence: *Helen Vykopal, Doctor of Clinical Psychology, Psychology, University of Auckland, 63 Castleton Street, Birkdale, Auckland 0626, New Zealand. E-mail: helenvykopal@gmail.com*

### Visuospatial Functions/Neglect/Agnosia

**A. GRABOWSKA, A. MARCHEWKA, J. SENIOW, K. POLANOWSKA, K. JEDNOROG, L. KROLICKI & A. CZLONKOWSKA. Prioritizing visual information by emotion: fMRI study of hemispatial neglect.**

**Objective:** The efficient, automatic detection of salient signals is essential for survival in many species. It is commonly believed that selection of important information for conscious awareness depends on selective attention. Recent studies show that emotion could modulate selective attention and influence the availability of stimuli to conscious experience. In the present study we examined whether patients with neglect characterized by loss of awareness for stimuli in the contralesional side of space are better able to consciously detect emotionally negative pictures than other visually similar neutral pictures.

**Participants and Methods:** To elucidate the neural mechanisms of these effects a functional MRI study was performed with IAPS stimuli presented in a divided visual field paradigm. Ten patients with left hemispatial neglect participated.

**Results:** The detection rate for emotional pictures presented in the neglected field (LVF) was higher than for neutral ones. FMRI data showed that successful detection of emotional stimuli presented in LVF as opposed to neutral stimuli produced activations in the parahippocampal and anterior cingulate areas in the right hemisphere. Detection of emotional stimuli presented in the intact field (RVF) activated a distributed network of the left hemisphere structures, including anterior and posterior cingulate cortex, insula, as well as visual striate and extrastriate areas. LVF-RVF contrasts for emotional stimuli revealed activations in right and left attention related prefrontal areas whereas RVF-LVF comparison showed activations in the posterior cingulate and lingual gyrus in the left hemisphere.

**Conclusions:** We hypothesize that beneficial role of emotion in overcoming neglect is achieved by activation of frontal and limbic lobe network which provide a privileged access of emotional stimuli to attention by modulation of their sensory processing. Application of emotional stimuli during rehabilitative training might facilitate cognitive recovery from unilateral spatial neglect.

Correspondence: *Anna Grabowska, PhD, Nencki Institute of Experimental Biology, 3 Pasteur St., Warsaw 02-093, Poland. E-mail: a.grabowska@nencki.gov.pl*

**J. INOUE & M. YASAKA. Relations between the compression ratio of the line bisection test and unilateral spatial neglect during activities of daily living performance.**

**Objective:** Left side of Unilateral Spatial Neglect (USN) is the failure to respond to stimuli presented to a left side of body. It is supposed a compression to a right side of visual representation as one of a mechanism of this USN. The purpose of this study was to examine whether a compression ratio in a line bisection test is associated with USN which is performing Activities of Daily Living (ADL).

**Participants and Methods:** Subjects were 34 patients with right brain damage by stroke (RBD). A Line bisection test that we used was a version included in the Behavioral Inattention Test. A subject marks middle point of lines three times in this version. A compression ratio of the line bisection test was calculated by a next calculating formula. That was "Length (mm) from the right-side end of a line to a middle point where a subject marked divided by half length (mm) of an original line multiplied by 100". Then, an average compression ratio was calculated at each subject. In the other, the Catharine Bergego Scale (CBS) was used for assessment of USN. The CBS is a list for an observer to check inattentive behavior to the left side during ADL performance of a subject. Relations of an average compression ratio in the line bisection test and the CBS score was examined by Spearman's rank correlation coefficient and simple regression analysis.

**Results:** An average compression ratio of RBD group was  $84.9\% \pm \text{SEM}3.0$ , and an average the CBS score was  $3.3 \text{ points} \pm \text{SEM}0.7$ . Coefficient of correlation - 0.60 between the average compression ratios and the CBS scores was significant ( $P = 0.00$ ). As a result of regression analysis, the average compression ratio of the line bisection test was useful for prediction of the CBS score.

**Conclusions:** These results seemed to suggest that USN is associated with compression of a line. Therefore we thought that information's about visual cognitive object in USN patients might be compressed to right side of real visual space.

Correspondence: *Junichi Inoue, Doctor of Philosophy, Rehabilitation, Kyushu Medical Center, Kokura-minami, Shigezumi 2-5-28, Kitakyushu 802-0811, Japan. E-mail: j-inoue@cma.bbq.jp*

**T. LOETSCHER, H. BAUMANN, C. TAMAGNI, M.E. NICHOLLS & P. BRUGGER. Neglect of Early Relative to Late Events after Right-Hemisphere Damage.**

**Objective:** Recent research on interactions between spatial and temporal processing revealed that healthy subjects represent the flow of time in a left-to-right direction, with early events being located to the "left" of later events (Santiago et al., *Psychon Bull Rev*, 2007). This would imply that the recall of events in the more distant past is hampered in the presence of left-sided hemispatial neglect. We set out to test this prediction in a verbal memory task.

**Participants and Methods:** 13 patients with left-sided spatial neglect and 9 control patients with right hemisphere damage, but without signs of neglect, participated in the study.

The verbal memory task involved the oral presentation of 10 words over three consecutive learning trials. Forty minutes after the learning trials, patients were requested to reproduce the words again ("delayed recall"). The dependent variable was the number of words produced in the delayed recall from the first half of the 10-word list relative to those from the second half of the list.

**Results:** Neglect patients recalled more words presented in the second half than in the first half of the 10-word list ( $p < .05$ , one-tailed). Controls did not show a bias for either half of the list. An additional analysis revealed that left-sided omissions in a standard cancellation task (Bell's test) were positively correlated with the inclination to recall words from the second relative to the first half (trend:  $r = .37$ ,  $p = .06$ ).

**Conclusions:** The current preliminary result suggest that hemispatial neglect is associated with a relative retrieval difficulty for words of the first half compared to the second half of an orally presented list of words. Substantiation with larger samples provided, this finding is compatible with early events being located "left" to later events as previously described for healthy subjects. The result adds to the idea of a common coding of space and time in the parietal lobes (Walsh, *TICS* 2003).

Correspondence: *Tobias Loetscher, School of Psychology, Flinders University, GPO Box 2100, Adelaide, SA 5001, Australia. E-mail: tobias.loetscher@flinders.edu.au*

### A. FOSTER. Integrated Rehabilitation for Traumatic Brain Injury in New Zealand: Clinical Services and Client Data.

**Objective:** The nation's largest service provider of acute and post-acute rehabilitation for traumatic brain injury (TBI) has provided services for over 800 clients in the north half of the North Island since 2008. Services are integrated across a multi-disciplinary team of clinicians including rehabilitation medicine, physiotherapy, occupational therapy, speech-language therapy, and clinical/neuropsychology. Social and community outcomes are supported by person-centred strategies for goal-setting and client engagement as well as the input of social workers and cultural liaisons. The focus of rehabilitation is placed on returning to personally relevant roles in the home, community, and workplace. Client management and effective communication across the clinical team is achieved through a web-based shared clinical record. An integrated database enables real-time data capture.

Consistent with international literature, the majority of individuals with moderate to severe TBI in New Zealand are male and under the age of 40. Māori clients were statistically over-represented relative to other ethnicities. The most common cause of TBI was vehicular accidents, followed by falls and assaults, and alcohol was a factor in at least 25% of TBIs. Clinical presentations and outcomes were dramatically heterogeneous; while approximately 35% of clients were able to transition directly to a community after acute care, a larger proportion entered an inpatient residential facility and still others required long-term services due to a minimally conscious state or other significant disabilities. Standardised outcome data such as FIM scores will be quantified. Future plans for prospective research within this client population will be discussed.

Correspondence: *Allison Foster, ABI Rehabilitation Management, 180 Metcalfe Road, Ranui, Auckland 70-039, New Zealand. E-mail: allison.foster@abirehab.co.nz*

### G. WHITENECK. The United States Traumatic Brain Injury Model Systems.

**Objective:** The Traumatic Brain Injury Model Systems (TBIMS) Program began in 1987 with funding from the U.S. Department of Education, National Institute on Disability and Rehabilitation Research (NIDRR). Currently, there are 16 TBIMS Centers providing treatment and conducting research to improve care and outcomes for individuals with TBI. There are 24 site-specific and 6 multi-center research studies are currently underway. Almost 500 peer-reviewed publications have resulted from TBIMS research. All TBIMS Centers participate in a longitudinal database that includes information on 10,000 adolescents and adults who were admitted for inpatient acute TBI rehabilitation. This database is the largest longitudinal study of TBI in the world and includes data on pre-injury, injury, acute care, rehabilitation, and outcomes at one, two and five years post injury and at every five years thereafter. Over 90 peer-reviewed publications have resulted from analyses of the TBIMS National Database. This presentation will give an overview of the TBIMS Program and present descriptive data from the TBIMS National Database.

Correspondence: *Gale Whiteneck, Craig Hospital, 3425 South Clarkson, Englewood, CO 80113. E-mail: gale@craig-hospital.org*

## International Keynote Address: Neuroimaging, Neural Connectivity and Neuropsychology

**Speaker: Erin Bigler**

**9:15–10:15 a.m.**

### E.D. BIGLER. Neuroimaging, neural connectivity and neuropsychology.

Contemporary neuroimaging, in particular advances in magnetic resonance imaging (MRI) using diffusion tensor imaging (DTI) and functional MRI (fMRI) techniques, now provide methods for directly examining the neural networks of the brain. DTI methods have greatly enriched the understanding of some neuropsychological principles in terms of brain-behavior relationships and the neural connectivity that

underlie them, which may also be tapped by resting-state fMRI. Disruptions in neural connectivity are central to all cognitive disorders and this presentation will highlight how the use of these methods advances the field of neuropsychology. Two disorders of connectivity but with very different etiologies will be highlighted: 1) Autism where no overt lesions/abnormalities are the norm in conventional neuroimaging studies yet DTI and fMRI findings show distinct problems of connectivity and 2) Traumatic Brain Injury with its distinctive lesion patterns where traumatic axonal injury disrupts pathways and connections in the brain. The increased importance of neuroimaging in the future of neuropsychology will be discussed.

Correspondence: *Erin D. Bigler, Ph.D., Psychology and Neuroscience, Brigham Young University, 1001 SWKT, Provo, UT 84602. E-mail: erin\_bigler@byu.edu*

## Session 2: Psychological and Cognitive Sequelae of Acquired Brain Injury

**10:45 a.m.–12:15 p.m.**

### M. KANGAS, R.L. TATE, J. WILLIAMS & R.I. SMEE. Are Family Carers as Stressed as Patients with a Primary Brain Tumor? An Investigation of Carer and Patients' Psychosocial Adjustment Pre and Post-Radiotherapy.

**Objective:** No published study to date has investigated the impact of brain tumor (BT)-related posttraumatic stress symptoms (PTSS) on the psychosocial well-being in adult BT patients and their family carers. Accordingly, the aim of this study was to assess the effects of BT-related PTSS on both patient and carers quality of life.

**Participants and Methods:** Utilizing a longitudinal design, 38 adult family carers as well as adults diagnosed with a primary BT were assessed on average, within 6-weeks prior to patients starting radiotherapy (T1), and re-assessed (N=27 dyads) at 3 months following patients completion of radiotherapy (T2). Patient-carer dyads were administered a battery of psychosocial scales measuring BT-related PTSS, mood, and quality of life.

**Results:** At both T1 and T2, a greater proportion of carers were found to report clinically elevated levels of PTSS pertaining to their family members BT experience. Specifically, at T1, PTSS was reported by 29% of carers and 18% of patients. Similarly at T2, PTSS was reported by 22% of carers and 14% of patients. PTSS in both carers and patients was associated with significantly reduced quality of life and elevated mood symptoms ( $p's < .05$ ).

**Conclusions:** Findings indicate both family carers and patients treated for a primary BT are at risk of suffering from clinically elevated stress, which seems to hamper their quality of life. The outcomes will be discussed in the context of developing and implementing appropriate assessment and rehabilitation services to address the needs of BT populations, as well as providing counselling support services for family carers.

Correspondence: *Maria Kangas, PhD, Psychology, Macquarie University, Macquarie University, Dept of Psychology, building C3A #717, Ryde, Sydney, NSW 2109, Australia. E-mail: maria.kangas@mq.edu.au*

### K. STRAITS-TROSTER, J. STRAUSS, L. TUPLER, D. DYCK, D. NORELL, M. MISAL, C. HOLMAN & D. PERLICK. An Adaptation of Multi-Family Group Treatment to Support U.S. Veteran TBI Survivors and their Families.

**Objective:** Although the long-term effects of traumatic brain injury (TBI) are still poorly understood, family life and social reintegration, both associated with post-deployment readjustment, are known to be impacted. This study examined the feasibility of adapting the Multi-Family Group (MFG) treatment model to reduce distress and isolation among cognitively impaired Veterans and their family members.

**Participants and Methods:** As part of a multi-site study underway in the Bronx, NY (coordinating site) and Durham, NC, Veteran-tailored TBI education and problem-solving skills training was developed for OEF/OIF Veterans. Each MFG included 5-7 Veterans with a diagnosis of TBI (N=15) and a family member (N=15). After initial meetings with a clinician and baseline assessments, families attended two 3-hour psychoeducational workshops followed by structured biweekly MFG meetings for up to 9 months.

**Results:** Baseline data for the first 3 groups indicated that Veterans scored well above the cut-off of 16 for depression on the CES-D ( $M=26.7$ ;  $SD=11$ ) and most scored  $>50$  on the PTSD Checklist ( $M=54.9$ ;  $SD=11$ ). Veterans showed mild to moderate deficits in verbal memory, attention and executive functions. Family members reported high levels of caregiver burden ( $M=31.1$ ;  $SD=22$ ) and symptoms of depression ( $M=19.8$ ;  $SD=10$ ). Three and six month follow-up data indicated improvement for Veterans and family members, including reduced family burden and depressive symptoms and increased use of problem solving and support seeking coping strategies.

**Conclusions:** Preliminary results suggest that this adaptation of the MFG model is feasible and may positively impact factors related to social reintegration among brain-injured Veterans and their families. Despite some studies finding limited benefits of CBT for SMI patients, Veterans with TBI and their families were able to benefit from a problem solving approach.

Correspondence: *Kristy Straits-Troster, PhD, ABPP, VISN 6 MIRECC, Department of Veterans Affairs, 508 Fulton St., Durham, NC 27705. E-mail: kristy.straits-troster2@va.gov*

### **K. HODGSON, A. HUTCHINSON, C. WILSON & T. NETTELBECK. A Meta-Analysis of the Effect of Chemotherapy on Cognition in Patients with Cancer.**

**Objective:** Chemotherapy-related cognitive impairment, or CRCI, is a form of cognitive deficit commonly reported following the administration of chemotherapy treatment in patients with cancer. The main aim of the present meta-analysis was to assess whether treatment with chemotherapy lead to cognitive impairment in cancer patients at large, with the scope being all forms of cancer that have been studied.

**Participants and Methods:** This meta-analysis included 12 studies, totalling 1241 participants, and examined the effect of chemotherapy on eight different domains of cognition across five cancer types. The relationship between treatment duration and cognitive impairment, and duration since treatment cessation and improvement in cognitive functioning were also assessed. A moderator analysis was conducted to examine whether age and sex significantly contributed to CRCI.

**Results:** Cognitive impairment was established only among breast cancer patients, across four cognitive domains. These were verbal function and language skill, orientation and attention, personal adjustment and emotional function and memory. At 12 months follow-up, deficits were identified in executive function and motor performance. Statistically significant impairment was not established in any cognitive domain for the other cancer types. Additionally, no relationship was found between cognitive impairment and the length of treatment or time since treatment cessation, or between age and sex and the occurrence of CRCI.

**Conclusions:** This study revealed that CRCI occurs in breast cancer patients. However, no statistically significant cognitive deficit was found for any other cancer type. Therefore, future research into CRCI in these other forms of cancer is important to clarify whether this is a breast-cancer specific issue.

Correspondence: *Kristy Hodgson, Bachelor of Health Sciences Hons, Psychology, Univ Adelaide, #39, DUDLEY AVENUE, Daw Park, SA 5041, Australia. E-mail: kristy.hodgson@adelaide.edu.au*

### **A. BAIRD, C. KRAIUHIN & R. MCKAY. Social Factors in Focal Retrograde Amnesia.**

**Objective:** Focal retrograde amnesia (FRA) is an intriguing condition and its aetiology raises questions about the long held organic versus psychogenic distinction. The majority of previously published FRA cases have documented premorbid psychosocial stressors, but the nature of these potentially precipitating factors is not well understood. We have previously documented increased self deception in the form of heightened self enhancement in a patient with FRA (Baird & McKay, *Neurocase* 2009). We aimed to further investigate this trait and other psychosocial factors in two additional FRA cases.

**Participants and Methods:** Both patients underwent comprehensive neuropsychological assessment and neuroimaging investigations, and also completed measures of personality (Eysenck Personality Questionnaire Revised, EPQ-R), social cognition (empathy questionnaire, EQ and Faux pas test) and self deception, specifically self enhancement (Positive illusions test). Potential psychosocial stressors (relationship, financial, forensic and employment) were also explored.

**Results:** There were two consistent features in the patients. Both showed significantly high scores on the validity (L) scale of the EPQ-R (98th and 100th percentile), regarded as a measure of social desirability. Both experienced premorbid psychosocial stressors in the form of relationship stress. Neither patient showed heightened self enhancement.

**Conclusions:** Two patients with FRA showed significantly increased social desirability scores on a personality measure. Although we did not replicate our previous finding of self deception in the form of heightened self enhancement, the current finding may be considered a form of deception of others. In addition, relationship stress appears to be a common psychosocial factor in cases of FRA.

Correspondence: *Amee Baird, PhD, Hunter Brain Injury Service, 313 Darby St Bar Beach, Newcastle, NSW 2300, Australia. E-mail: ameebaird@yahoo.com.au*

### **S.L. BARKER-COLLO, V. FEIGIN, V. PARAG & C. LAWES. Cognitive and functional outcomes 5-years post-stroke: Examination of a large population-based sample.**

**Objective:** Understanding the extent of long-term neuropsychological deficits post-stroke and their contribution to functional outcomes is essential for evidence-based rehabilitation and resource planning. However, most existing neuropsychological stroke data are not population-based, examine limited outcomes and short-term follow-up. Our objective was to examine long-term (5-year) outcomes using a population-based sample.

**Participants and Methods:** Participants were 307 5-year survivors of incident stroke. Neuropsychological performance was assessed across areas of memory, executive function, information processing speed (IPS), visuo-perceptual/construction ability, and language. Also assessed were depression, and functional outcomes (handicap, disability and Quality of Life).

**Results:** The greatest proportion of participants exhibited neuropsychological functioning within the average range, while 30-50% performed at lower levels on most measures. Few performed above the average range. Deficits were most common in executive functioning and IPS, and 30.4% of participants were depressed. While correlation analyses indicate all cognitive domains are significantly related to functional outcomes, multiple regressions showed that only IPS and visuo-perceptual ability made significant independent contributions to functional outcomes over and above age, depression and current Barthel Index. Depression also made a significant and independent contribution to functional outcomes.

**Conclusions:** A considerable proportion of 5-year stroke survivors experience neuropsychological deficits; particularly in IPS and executive functioning. Visuo-perceptual/construction abilities, visual memory and IPS were independently associated with handicap, disability, HRQoL over and above contributions made by age, depression, and stroke severity suggesting these areas as potential targets for intervention.

Correspondence: *Suzanne L. Barker-Collo, PhD, Psychology, University of Auckland, Private bag 92019, Auckland 1141, New Zealand. E-mail: s.barker-collo@auckland.ac.nz*

### **M. ENNOK, K. SIKK, S. HALDRE & P. TABA. Cognitive Profile of Patients with Manganese-Ephedrone Related Encephalopathy.**

**Objective:** In last decade neurologists in Eastern-European countries have observed young patients with pronounced parkinsonian syndrome with characteristic clinical features of hypokinesia, dysarthria, dystonia and postural dysfunction. These symptoms developed after long term injections of designer drug containing ephedrone (methcathinone) and high level of manganese as a toxic byproduct of synthesis. This syndrome is mostly known by case reports. The aim of our study is to describe the cognitive features associated with this condition.

**Participants and Methods:** A sample of 14 patients (12 men, 2 women) with mean age of 33.1 years and mean education of 9.8 years were assessed. Their results were compared with 14 demographically matched control subjects. A comprehensive assessment with tests of general intelligence, attention, learning and memory, visuospatial skills, motor proficiency and executive abilities was performed.

**Results:** In general patients had an average level of intelligence with no notable difference between verbal and performance scale. They had poorer results in tests requiring motor response. Differences with control group were evident also in some scores of memory and executive function tests.



**Conclusions:** Patients with manganese-ephedrone related encephalopathy showed a favorable cognitive outcome with minor deficits across different cognitive domains. Most differences with control group were due to their motor deficits with restricted response speed and precision. Our results are consistent with recent case reports that note only mild cognitive impairment in contrast with significant motor problems in these patients.

Correspondence: *Margus Ennok, MSc, Department of Neurology and Neurosurgery, University of Tartu, L. Puusepa 8, Tartu 51014, Estonia. E-mail: margus.ennok@ut.ee*

### Session 3: Paediatric Traumatic Brain Injury

10:45 a.m.–12:15 p.m.

**J. PAPOUTSIS, R. STARGATT & C. CATROPPA. Support for the Early Vulnerability Hypothesis: Mild TBI Sustained in Early Childhood is Associated with Ongoing Sequelae.**

**Objective:** Very young children have the highest rate of mild TBI. Given the heightened vulnerability associated with TBI sustained at an early age, such as greater vulnerability of the younger brain to diffuse insult, the potential for early insults to result in greater alterations in normal neuronal development, and a greater effect of cognitive deficits acquired at an earlier age on subsequent developmental progress, this research investigated the long-term cognitive, behavioural and social outcomes following early mild TBI.

**Participants and Methods:** Fifty-two children who sustained a mild TBI were recruited into the study and characterised as having sustained a complicated or uncomplicated mild TBI based on injury severity. The clinical groups were compared to 33 typically developing controls. Cognitive, behavioural and social measures were administered to each child at least 7, and up to 10 years, post-injury.

**Results:** The results showed that children who sustained a complicated mild TBI performed poorer on measures of executive functioning (specifically cognitive flexibility) when compared to the uncomplicated mild TBI and control groups; younger age at injury and neurological symptoms were strong predictors of outcome for this domain. The complicated mild TBI group were also rated as having more behavioural problems when compared to the uncomplicated mild TBI or control group, with younger age at injury being a risk factor for internalising problems.

**Conclusions:** These results argue for a stratified definition of mild TBI and strongly suggest that early mild TBI is associated with significant ongoing sequelae in cognitive and behavioural functioning many years after the initial injury. Social functioning does not seem to be impacted on by early injury.

Correspondence: *Jennif Papoutsis, Doctor Clinical Neuropsychology, Psychology, La Trobe, 36A Dickens Street, Bentleigh, VIC 3204, Australia. E-mail: jennypappy@hotmail.com*

**S. ROSEMA, L. CROWE & V. ANDERSON. Social functioning in children and adolescents after brain injury: a systematic review.**

**Objective:** Following traumatic brain injury (TBI) in childhood and adolescence social dysfunction has been consistently reported and can have significant and debilitating consequences. From a social neuroscience perspective, evidence suggests that social skills are not localised in a specific area in the brain, but are mediated by an integrative neural network and therefore a TBI can disrupt these neural connections, while they are in the process of being established, resulting in social dysfunction. In order to clarify the prevalence and nature of social dysfunction following paediatric TBI, studies of social outcomes in children and adolescents after TBI over the last 20 years were reviewed, using a conceptual framework by Beauchamp and Anderson (2010).

**Participants and Methods:** Search terms used were based on Yeates' et al (2007) and Beauchamp and Anderson's (2010) models and combined with TBI terms. Articles needed to focus on either children or adolescents. The search was conducted in PsychInfo, Medline, CINAHL databases and The Cochrane Controlled Trails Register, and yielded 286 English publications over the past 20 years.

**Results:** Twenty-three publications, mainly focusing on social adjustment, - cognition and - interaction, met the criteria. Results indicated that children with TBI are at risk of impaired social function, but results were inconsistent. Further, a dose-response pattern between injury severity and social dysfunction was not always evident.

**Conclusions:** This systematic review identified studies which examined social function in children and adolescents after TBI. From the available literature, the true effect of TBI on social outcomes in children and adolescents is unclear. The limited literature dedicated to this topic and the varied results from published studies suggests that social outcome after TBI in children and adolescents needs further investigation.

Correspondence: *Stefanie Rosema, Master in Psychology, Murdoch Children's Research Institute, 3-19 William St, South Yarra, VIC 3141, Australia. E-mail: stefanie.rosema@mcri.edu.au*

**M.H. FRITH, L. TOGHER, A. FERGUSON, W. LEVICK & K. DOCKING. Assessment of children with communication difficulties after TBI: Is the practice of SLPs Evidence Based?**

**Objective:** Research into the effects of traumatic brain injury (TBI) on the language and communication abilities of children has highlighted deficits in conversational language and written language skills. This study examined the extent to which Speech-Language Pathologists (SLPs) are applying this evidence in their work with children with acquired communication disorder (ACD) following TBI.

**Participants and Methods:** SLPs (n=20 and still recruiting) from Australia, New Zealand and United Kingdom working with children post-TBI completed an online survey. The Survey examined assessment practices (areas of ability assessed and instruments used) and the SLPs perceptions of the usefulness of their assessments in identifying weaknesses and informing intervention.

**Results:** Preliminary results indicate a focus on assessment of core language processes such as receptive and expressive language compared with discourse, written language and word finding skills. SLPs tend to use routinely available instruments, particularly the Clinical Evaluations of Language Fundamentals 4th Edition (CELF 4) (74% of SLPs recruited) rather than instruments designed to target aspects of communication more likely to be affected in TBI.

**Conclusions:** Results point to a gap between the practice of the majority of SLPs and the available evidence relating to post-TBI ACD. SLPs appear to use commonly available instruments rather than less well-known ones which better target the most likely areas of deficit post-TBI. The implications of this practice-evidence gap for effective rehabilitation of children are discussed together with some preliminary directions for improving practice.

Correspondence: *Matthew H. Frith, B SPTH (Hons), Paediatric Brain Injury Rehabilitation, Kaleidoscope: Hunter Children's Health Network, PO BOX 2563, Dangar, NSW 2291, Australia. E-mail: matthew.frith@hnehealth.nsw.gov.au*

**M. MEALINGS & J. DOUGLAS. Considering the Student Perspective in Returning to School after TBI: a Literature Review.**

**Objective:** This paper aims to i) present a systematic review of the literature exploring students' perspectives of their educational experiences following TBI, ii) identify important themes arising from this material which may assist clinicians and educators in improving support services and outcomes for their clients.

**Participants and Methods:** A systematic search was conducted of appropriate databases as well as manual searches of key references and expert authors. Identified abstracts were scanned for relevance: i) informants must include students with TBI, ii) data collection included students' perspectives, iii) data focussed on students' participation in any phase of the study process eg return to education, ongoing participation or transitions out of school. No restrictions were placed on i) severity of injury, ii) age of injury onset, iii) timing of data collection in relation to time post injury or time since return to school, iii) whether informant was a current student. Identified articles were retrieved in full text and reviewed by both authors.

**Results:** Search results identified over 400 articles. After screening of titles and review of abstracts, 8 articles met the relevance criteria. They showed large variations across informant characteristics,

range of informants and research designs. Despite the methodological heterogeneity of these investigations, a number of recurring themes outlining the students' perspectives were evident. These included: difficulties identified by the students, impact of these difficulties upon their studies, facilitators and barriers to school participation.

**Conclusions:** In this review the students' stories provided a range of views, some of which resonated with the expert opinions widely published but there were also important insights which extend our understanding of the student experience and highlight areas for further consideration.

Correspondence: *Margaret Mealings, B App Sc (speech path), Community Integration Team, Epworth Healthcare, 89 Bridge Rd, Richmond, VIC 3121, Australia. E-mail: margaret.mealings@epworth.org.au*

#### **A. MCKINLAY, R. GRACE, T. MCLELLAN & D. ROGER. Predicting adult offending behavior for individuals who experienced a Traumatic Brain Injury during childhood.**

**Objective:** There is increasing evidence that childhood traumatic brain injury (TBI) can result in negative outcomes during adulthood, including participation in offending behavior. Little information exists regarding the characteristics of at risk children, removing the opportunity for early intervention. This study identifies the characteristics of individuals who had experienced a TBI event in childhood and subsequently had an increased risk of offending behavior in adulthood.

**Participants and Methods:** Using a longitudinal design, individuals in the Canterbury region who had experienced a TBI between 0-17 years, now 18 years or older and more than 5 years post injury, were invited to take part in the study. This resulted in three groups: 1) moderate/severe TBI (n=65), 2) mild TBI (n=61) and 3) a fracture control group (n=43). A semi structured interview assessed the participant's lifetime involvement in offending behaviour, with the Emotional Behaviour Scale measuring internalizing and externalizing behavior (malevolent aggression, social anxiety and social self-esteem).

**Results:** Compared to controls, TBI was significantly associated with increased risk of offending behavior (mild TBI OR=8.7, moderate/severe TBI OR=20.4). Binary Logistic Regression analysis revealed that for moderate/severe TBI, the strongest predictors of offending behaviour was TBI status, higher levels of malevolent aggression and lower levels of social anxiety. For the mild TBI group, offending behavior was not associated with TBI status.

**Conclusions:** We found evidence of increased offending behavior during adulthood for individuals who had experienced a TBI during childhood. Measures of emotional behavior were useful predictors of offending behavior and offer an opportunity for early intervention.

Correspondence: *Audrey McKinlay, University of Canterbury, Private Bag 4800, Christchurch 8024, New Zealand. E-mail: audrey.mckinlay@canterbury.ac.nz*

#### **S. BENSON, A. WARD, M. WAUGH, J. THOMPSON & A. TIKU. Executive Function in Preschool Children after Early TBI: A Pilot Study.**

**Objective:** Research on longer term outcomes for children sustaining a traumatic brain injury at less than 12 months of age is limited. We investigated the development of cognitive skills including executive function and the relationship to behavioural, social and emotional development at school entry. It was hypothesised that children sustaining a TBI at less than 12 months of age will have cognitive impairment; that impairment to developing executive functions exists and can be demonstrated and that deficits in executive function will be correlated with impairments in behavioural, social and emotional development.

**Participants and Methods:** A pilot study of 20 children who had sustained a significant TBI at less than 12 months were seen at school entry (ave age 4 yrs 6 mths). They were recruited as a convenience sample through a long term brain injury service follow-up program. They received standardised physical, neuropsychological and behavioural assessment. Norm referenced measures included:

- BRIEF-P,
- The Child Behaviour Checklist (preschool)
- WPPSI-III.

**Results:** Descriptive statistics, correlational analyses and t-tests using comparison to the normative data were conducted. The results show statistically significant impairment in cognitive functions ( $p < .001$ ) as well as significant difficulties in aspects of executive functions. There was no evidence of clinically significant behavioural problems at a group level.

**Conclusions:** Consistent with other studies this cohort of children with early traumatic brain injury showed deficits in intellectual functions. The findings extend the literature on children injured at less than 12 months of age and provide support for the presence of impairments in executive based functions at an early age. The clinical utility of the measures used will be discussed.

Correspondence: *Suzanne Benson, BA (Hons); M. Clin Psychol.; M. Clin Neuropsychol, Kids Rehab, The Childrens Hospital at Westmead, Locked Bag 4001, Westmead, NSW 2145, Australia. E-mail: suzannb7@chw.edu.au*

### **Session 4: Parkinson's Disease And Other Dementias**

**10:45 a.m.–12:15 p.m.**

#### **A.I. TROSTER, D. BOWERS & B. LEVIN. Group and Individual Neuropsychological Outcomes After Bilateral Subthalamic Deep Brain Stimulation in Parkinson's Disease: A Delayed-Activation Arm Controlled, Randomized, Multicenter Study.**

**Objective:** To compare the 90-day neuropsychological outcome of Parkinson's disease (PD) groups undergoing either electrode implantation and bilateral subthalamic (STN) deep brain stimulation (DBS) using constant current or electrode implantation only. STN DBS is generally cognitively safe. Most common are mild to moderate verbal fluency decrements. The cognitive safety of constant current DBS has not been evaluated. This is the first study to use a delayed activation control to evaluate neuropsychological (NP) effects of STN DBS vs. lead placement.

**Participants and Methods:** 136 PD patients without dementia were randomized in a 3:1 ratio to a group undergoing DBS immediately after implantation of the system (active stimulation; AS) and a group whose system was activated 90 days after implantation (delayed activation; DA). Pre-surgical and 90-day evaluations measured overall level of cognitive functioning, executive function, working memory, verbal fluency, verbal and visual memory, and mood state.

**Results:** Both groups were about 60 years old at baseline and did not differ on baseline cognition and depression measures. Motor outcome at 90 days was significantly better in AS than DA. Mean changes on cognitive measures were comparable in AS and DA when baseline and study site differences were controlled. Declines in both groups' verbal fluency scores were common, occurring in 21% to 49% of patients on the letter, category, and switching tasks. Proportions of patients whose scores remained unchanged or improved or declined by 1 SD or more were similar in the groups. Depression symptoms improved significantly in AS vs. DA (HDI,  $p < .005$ ), and the proportion of patients showing improvements tended to be greater in AS than DA ( $p = .08$ ).

**Conclusions:** Bilateral STN stimulation appears cognitively safe and is associated with improvements in depressive symptomatology. Stimulation and lead placement surgery alone are associated with similar cognitive changes and short-term declines may thus be attributable to system implantation.

Correspondence: *Alexander I. Troster, PhD, Dept. of Neurology (CB 7025), University of North Carolina School of Medicine, 3128 Physicians' Office Building, 170 Manning Drive, Chapel Hill, NC 27599-7025. E-mail: trostera@neurology.unc.edu*

#### **S. BUXTON, L.J. TIPPETT & L. MACDONALD. Impact of Parkinson's Disease on Social Relationships.**

**Objective:** Social relationships require effective comprehension and production of emotional facial expressions and voice tones. This study aimed to investigate the impact of impaired recognition and production of emotion, via facial expressions and voice tone, on social relationships. It was hypothesised that individuals with Parkinson's disease (PD) would experience less satisfying social relationships than closely-matched older adults.

**Participants and Methods:** The PD group (n=30) previously identified as impaired at recognition and production of facial expressions and voice tone, and 30 closely-matched individuals participated in a semi-structured interview, including rating scales, investigating self-reported depression and satisfaction with social relationships.

**Results:** Mann-Whitney U tests revealed that the PD group were less satisfied with the quality of their relationships with both close others and acquaintances than the Control group. They also wanted to spend more time with close others, even though they already spend significantly more time with them than healthy Controls. The PD group also reported that others misunderstood their voice tone and facial expressions more frequently than the Control group, but did not report that they misunderstood others' emotional expressions more than healthy Controls. Spearman's correlations revealed significant associations between how well the PD group felt they were understood by others (in terms of facial expressions and voice tone) and their satisfaction with social relationships.

**Conclusions:** Individuals with PD are less satisfied with their social relationships than healthy controls. This satisfaction is associated with how well they report that others understand their facial expressions and voice tone. PD participants were unaware of their own recognition deficits. These factors contribute significantly to poorer communication, resulting in poorer quality of relationships. Verbal communication training may assist to promote improved quality of social relationships.

Correspondence: *Sharon Buxton, PhD candidate, Psychology, University of Auckland, 22 Carmore Place, Torbay, Auckland 0630, New Zealand. E-mail: shazb@xtra.co.nz*

#### **M. IRISH, J.R. HODGES & O. PIGUET. Impaired Episodic Future Thinking in Frontotemporal Dementia - Evidence For a Compromised Default Network.**

**Objective:** Retrieval of past autobiographical events is compromised in frontotemporal dementia (FTD). Little is known, however, regarding the capacity of FTD patients for simulating future autobiographical events. The neural substrates of past and future episodic simulation are those harbouring significant atrophy in FTD, suggesting that future thinking would be compromised in FTD.

**Participants and Methods:** Seven behavioural variant (bv-FTD) and seven semantic dementia (SD) patients were compared with seven Alzheimer's disease (AD) and seven healthy controls on past autobiographical recall (in the last year) and future episodic simulation (within the next year). To investigate potential mechanisms mediating episodic future thinking, participants were also tested across a number of domains including prospective memory and theory of mind.

**Results:** SD patients were impaired only for simulation of future events, recalling past episodic events at control levels. In contrast, bv-FTD and AD patients were impaired for both past retrieval and future simulation conditions, at differential levels. Theory of mind was intact in AD, but not in FTD, with bv-FTD patients showing the most profound deficits. All patient groups were impaired on the prospective memory task, at varying levels. Correlational analyses for all groups combined revealed that the capacity for episodic future simulation was strongly related to past autobiographical recall and prospective memory performance.

**Conclusions:** Our findings highlight the importance of semantic memory in facilitating the projection of oneself into the future, and point towards key aspects of the default network (theory of mind, prospective memory) that are compromised in FTD.

Correspondence: *Muireann Irish, Neuroscience Research Australia, Barker Street, Randwick, Sydney, NSW 2031, Australia. E-mail: m.irish@neura.edu.au*

#### **R. KANE, K. MORDECAI, K. ANDERSON, A. CERNICH, L. GRATAN, W. WEINER, P. SHORT, S. REICH & L. SHULMAN. Functional Capacity in Parkinson's Disease: The Value Added of Assessing Cognition.**

**Objective:** To assess the independent contribution of cognition to the functional capacity of patients with Parkinson's disease (PD)

**Participants and Methods:** Participants were non-demented PD patients being treated at the University of Maryland's Parkinson Disease and Movement Disorders Center (PDMDC). All volunteered to take part in a DoD funded project to validate a computerized neurocognitive measure (ANAM) for the assessment of cognitive changes in PD. In addition, the PDMDC maintains a detailed database on their patients, which includes disease status, behavioral, quality of life, and functional measures. A total of 108 PD patients and 57 healthy controls participated in the study. From these, data from both data sets were available on 42 PD patients. To assess the independent contribution of the cognitive measures to functional capacity, we used regression analysis to assess the relationship between ANAM measures and scores for ability to complete activities of daily living and instrumental activities of daily living as measured by the OARS Multidimensional Functional Assessment Questionnaire (OARS).

**Results:** Regression models included measures of disease severity (UPDRS motor), depression (BDI-II) and cognition (ANAM). Results indicated that ANAM tests measuring working memory and sustained attention, as well as an overall index of cognitive function, accounted for significant unique variance on the OARS after controlling for the effects of disease severity and depressive symptoms.

**Conclusions:** Our findings suggest that cognition significantly impacts functional abilities in non-demented PD patients with working memory and sustained attention being of particular importance. Previous analyses demonstrated that ANAM results were concordant with those obtained with traditional measures in detecting cognitive impairment in PD. Present results provide additional evidence that ANAM is a useful tool for measuring cognitive functioning in PD by demonstrating a relationship between test results and functional capacity.

Correspondence: *Robert Kane, Ph.D., robert.kane, Defense & Veterans Brain Injury Center, 3604 Whitehaven Pkwy NW, Washington, DC 20007. E-mail: robert.kane@hotmail.com*

#### **P. CANNAN, C. SKILBECK & T. CROFT. The Cognitive Profile in Parkinson's Disease.**

**Objective:** Parkinson's Disease (PD) is a neurodegenerative condition of sub-cortical origin. While primarily considered a motor disorder, up to 90% of individuals with PD experience cognitive dysfunction, principally affecting delayed memory recall, visuo-spatial, and executive functioning. This number varies greatly depending on the assessment tool used. Mood symptoms are also common in PD with up to 76% experiencing anxiety or depression. The study's aims were to compare a new sample of PD patients' cognitive scores with those provided in a popular neuropsychological battery, and to examine the effects of mood and premorbid IQ on the scores.

**Participants and Methods:** 65 participants with idiopathic PD recruited from a hospital outpatient clinic were assessed using the RBANS (Repeatable Battery for the Assessment of Neuropsychological Status), NART, and the HADS (Hospital Anxiety & Depression Scale).

**Results:** Normative data for the RBANS were used to generate a typical PD profile and look at dementia in a general PD population. Results are consistent with the Manual's normative data but show greater impairment on immediate recall, attention, and delayed recall and reasonably well preserved functioning within the visuo-spatial domain. Those domains with greater impairment correlated highly with pre-morbid IQ. Scores on all domains were also highly correlated with anxiety and depression.

**Conclusions:** The RBANS Manual provides normative PD data, but clinical use is limited by a lack of an executive component and by poor sensitivity to detect visuo-spatial deficits: it may be unable to accurately detect dementia. Correlations between pre-morbid IQ and immediate memory (0.608), attention (0.412) and delayed memory (0.468) indicate that the rate at which these domains are affected may be predictable. The high correlations of RBANS total score with anxiety (-0.456) and depression (-0.489) suggest that better management of mood symptoms may improve cognitive performance.

Correspondence: *Clive Skilbeck, PhD, psychology, university of tasmania, sandy bay campus, hobart, TAS tas 7001, Australia. E-mail: clive.skilbeck@utas.edu.au*

## THURSDAY AFTERNOON, JULY 7, 2011

**National Keynote Address:  
The Bright Tax: What Penalizes Higher Fluid  
Intelligence in Old Age?**

**Speaker: James Flynn**

**1:15–2:15 p.m.**

**J.R. FLYNN. The Bright Tax: What Penalizes Higher Fluid  
Intelligence in Old Age?**

Does cognitive decline with age vary by ability and cognitive level? Using WAIS standardization samples, it is found that after age 65, the brighter the person the greater the decline: those at the median lose an extra 6.35 points (SD = 15) compared to those one SD below the median, those one SD above the median lose an extra 6.20 points compared to those at the median, and those two SDs above the median lose an extra 3.40 points compared to those one SD above. The cumulative penalty for being very bright rather than below average is 16 IQ points. Much the same is true of processing speed. The reverse is true of verbal ability where there is a "bright bonus" of 6.30 points. Working memory appears bright neutral with age.

This focuses research on brain physiology and the retirement environment as possible causes of this disturbing pattern.

Correspondence: *James R. Flynn, PhD, POLS, Univeristy of Otago, Box 56, Dunedin 9001, New Zealand. E-mail: jim.flynn@stonebow.otago.ac.nz*

**INS Presidential Address:  
Whither (Wither?) Neuropsychology?**

**INS President: Rus Bauer**

**2:15–3:15 p.m.**

**R. BAUER. Presidential Address: Whither (Wither?)  
Neuropsychology?**

With a tip of the hat to previous Australasian society presidents who have pondered the future of their respective disciplines, this talk will offer commentary on the trajectory of modern neuropsychology as a research discipline in contemporary neuroscience. Although the field, now in its adolescence, appears to be growing and thriving, some tough challenges face us as we move to the future. This address focuses on some of these key challenges, including (a) the need to establish a firmer evidence base in applied neuropsychology, (b) an increasingly crowded interprofessional landscape, with resulting competition and role diffusion, (c) challenges and barriers to disseminating neuropsychological science to policy makers and the public, and (d) emerging challenges in educating and training the next cadre of neuropsychological researchers so that they can maintain their central role in interdisciplinary brain science. I will argue that now is the time to refine, reaffirm, and make more relevant the core features that distinguish the neuropsychological approach from that taken by other disciplines. This needs to be accomplished in a way that is meaningful not only to us, but also to those who have a stake in the outcomes of neuropsychological research.

Correspondence: ., . E-mail:

**Symposium:  
Understanding Social Functioning after Early  
Brain Insult**

**Chair: Megan Spencer-Smith**

**3:45–5:15 p.m.**

**M. SPENCER-SMITH. Understanding social functioning after early  
brain insult.**

**Symposium Description:** While it is widely known that children with brain insult can experience significant cognitive impairments, less is known about the implications for their social functions. The aim of this symposium is to describe social functioning in children with brain insult and to look at the mechanisms underlying impairments.

The symposium begins with a paper that examines the role of age at insult in understanding social outcomes in childhood, with findings that emphasise the vulnerability of social functions after early focal brain insult.

The next two papers investigate social difficulties in young people with agenesis of the corpus callosum, a common brain malformation. Firstly, the role of attention processes in social functioning will be examined in a case series using clinical measures. Then, facial emotion processing will be investigated using experimental measures. These papers highlight the role of cognitive processes in understanding aspects of social functioning as well as brain MRI factors, genetics and seizures.

The final two papers in this session will investigate social impairments after pediatric traumatic brain injury. Firstly, language and social difficulties will be investigated in preschoolers with traumatic brain injury sustained before 3 years of age using clinical measures, including parent and teacher rated questionnaires. Then social impairments in adolescents with traumatic brain injury will be examined using a range of measures including pencil and paper, video, computerised and neuroimaging tasks. These studies emphasise the importance of multi-modal measures and different informants to achieve a better way of understanding social functioning.

Correspondence: *Vicki A. Anderson, Psychology, Royal Children's Hospital, Flemington Road, Parville, VIC 3052, Australia. E-mail: vicki.anderson@rch.org.au*

**V.A. ANDERSON, M. GREENHAM & M.M. SPENCER-SMITH.  
Social functioning and early brain insult: is there an 'age at insult'  
effect.**

**Objective:** Social dysfunction is commonly reported by survivors of brain insult, and is often rated as the most debilitating of all sequelae, impacting on many areas of daily life, as well as overall quality of life. Within the early brain insult (EBI) literature, physical and cognitive domains have been of primary interest and social skills have received scant attention. As a result it remains unclear how common these problems are, and whether factors predictive of recovery (motor, speech, cognition) also contribute to social outcomes.

**Participants and Methods:** This study compared social outcomes for 160 children sustaining focal brain insults at different times from gestation to late childhood to determine whether EBI was associated with an increased risk of problems. Children's teachers completed questionnaires measuring social function (Strengths and Difficulties Questionnaire, Walker-McConnell Scale of Social Competence and School Adjustment).

**Results:** Analyses showed that children with early focal brain insult were at increased risk for social impairment compared to normative expectations. Brain insult before 2 years was associated with most significant social impairment, while children with EBI in the preschool years and in late childhood recoded scored closer to normal. Lesion location and laterality were not predictive of social outcome, and nor was social risk. In contrast, presence of disability (seizures) and family function were shown to contribute to aspects of social function.

Correspondence: *Vicki A. Anderson, Murdoch Childrens Research Institute, Melbourne, VIC 3052, Australia. E-mail: vicki.anderson@rch.org.au*

**M. SPENCER-SMITH, A. WOOD, R. LEVENTER & V. ANDERSON.  
Social functioning and attention in young people with agenesis of  
the corpus callosum.**

**Objective:** Children with agenesis of the corpus callosum (ACC; a common brain malformation) experience difficulties in many aspects of social functioning. This study aimed to further understand these impairments by examining the attention profiles of children with ACC. Factors that might facilitate or interrupt better development of attention were considered.

**Participants and Methods:** The sample included five school age children diagnosed with ACC by MRI and recruited from the Royal Children's Hospital, Melbourne. Children completed a comprehensive assessment of components of the attention network and caregivers completed a questionnaire and interview to assess social functioning. Seizure history and genetic factors were recorded from medical record reviews. Brain MRI scans were coded by a paediatric neurologist and diffusion weighted images were examined for attention networks.

**Results:** There was variation in the neurological, neuroimaging, and genetic presentation of children in the sample. Problems in social functioning were common. Impairments in attention were observed, with greatest difficulties in executive attention. Development of attention in children with ACC is likely to be influenced by MRI factors (partial or complete ACC, size of anterior commissure, other brain pathology), seizures, and genetic factors.

Correspondence: *Megan Spencer-Smith, Murdoch Childrens Research Institute, Melbourne, VIC 3052, Australia. E-mail: megan.spencer-smith@mcri.edu.au*

**A. MCILROY, M. NICHOLLS, M. SPENCER-SMITH, V. ANDERSON & A. WOOD. Social emotion processing in young people with agenesis of the corpus callosum.**

**Objective:** It is widely recognised that social functioning is compromised in individuals with Agenesis of the Corpus Callosum (ACC). This is a major concern for families with a child who has ACC because social functioning may influence academic achievement and quality of life. While emotion processing is important for efficient social functioning, few studies have examined these capabilities in children and young people with ACC. The current study characterised the impact of ACC on facial emotion processing in young people. In line with findings from language lateralisation research in individuals with ACC, it was predicted that performance on tasks used as indicators of the lateralisation of facial emotion processing mechanisms would be typical, but interhemispheric transfer of this information would be impaired. Furthermore, the integration of affective language and non-verbal emotion indicators is also likely to be impaired, reflecting reduced integration of information.

**Participants and Methods:** Young people aged 8 to 25 years with partial or complete ACC diagnosed via MRI were recruited through the Royal Children's Hospital, Melbourne. Participants completed a comprehensive neuropsychological assessment, including three computerised behavioural tasks to examine lateralisation and interhemispheric transfer of facial emotion information. A subset of individuals also completed an emotion fMRI task to examine the potential neurological mechanisms associated with impaired social functioning.

**Results:** Findings from this study will provide families with a more accurate prognosis about the social difficulties their child might experience. This information is important for developing targeted interventions to support optimal quality of life for individuals with ACC.

Correspondence: *Alissandra McIlroy, University of Melbourne, Melbourne, VIC 3010, Australia. E-mail: a.mcilroy@pgrad.unimelb.edu.au*

**L. CROWE, C. CATROPPA, F. BABL & V. ANDERSON. Social function outcomes following traumatic brain injury before 3 years of age.**

**Objective:** To examine the social function outcomes in children who sustained a traumatic brain injury (TBI) prior to 3 years of age. Recent models have highlighted the role of cognitive skills (executive function, language) for efficient social functioning. This study will examine the contribution of language. Language is an emerging skill in young children and therefore liable to disruption following TBI.

**Participants and Methods:** The sample consisted of 31 children who sustained an accidental TBI (mild and moderate/severe) before 3 years and a group of 16 uninjured children matched for age, gender and socio-demographic factors that comprised the control group. Social skills were rated by both parents and teachers. Child-based assessments of expressive and receptive language skills were also administered.

**Results:** Children with a TBI sustained before 3 years had poorer social skills than children in the control group. Children with TBI also performed significantly below children in the control group on language assessments.

**Conclusions:** TBI sustained prior to 3 years has a significant impact on social and language skills. The role of language in social competence of preschoolers will be discussed.

Correspondence: *Louise Crowe, Murdoch Childrens Research Institute, Melbourne, VIC 3052, Australia. E-mail: louise.crowe@mcri.edu.au*

**M. BEAUCHAMP, J. DOOLEY & T. SILK. Social outcomes in adolescents with TBI: multimodal approaches.**

**Objective:** Paediatric traumatic brain injury (TBI) can result in cognitive and behavioural problems with implications for social functioning and may result in socially maladaptive behaviours. However, little is

known of the specific origin of problem behaviours, in part due to the limitations of traditional approaches to socio-cognitive assessment. The use of multi-modal evaluation approaches may be helpful in shedding light on the cognitive and neural mechanisms underlying social difficulties in adolescents with TBI.

**Participants and Methods:** Social outcomes were evaluated in adolescents with TBI and age-matched controls (12-16 years) using paper-pencil, video, computerized and neuroimaging tasks targeting theory of mind, empathy, social information processing and moral reasoning.

**Results:** Findings from these studies indicate that adolescents who sustain TBI in childhood have impairments in a number of socio-cognitive abilities. In particular, those with severe TBI show less mature moral reasoning and more hostile intent attribution on two novel visual tasks (So-Moral, BrainQuest). In addition, a functional magnetic resonance imaging study of empathy shows that there are functional differences in brain regions associated with empathy (e.g., amygdala, TPJ) when adolescents with TBI are asked to view situations in which others feel pain.

**Conclusions:** The use of diverse techniques for the assessment of social cognition can provide multiple perspectives of social outcomes after pediatric TBI, particularly during adolescence when individuals gain greater social independence and awareness of society and the peers around them. Visual and video-based tasks may be particularly helpful as they strengthen ecological validity and increase individual engagement and emotional involvement in assessments.

Correspondence: *Miriam Beauchamp, University of Montreal, Montreal, QC J4K2 W6, Canada. E-mail: miriam.beauchamp@umontreal.ca*

**Session 7:  
Language and Communication**

**3:45-5:15 p.m.**

**L.L. PATSTON & L.J. TIPPETT. Background Music Decreases Performance of Language Comprehension in Musicians.**

**Objective:** Musicians comprise a unique population in which persistent music practice, involving complex cognitive and motor tasks, dates back to childhood when the potential for neural plasticity in brain development is at its highest. There is evidence to suggest music training results in an increased involvement of the left hemisphere for music processing in musicians, and it is speculated that the leftward activation seen in musicians represents their tendency to process music like a language. If language and music are not distinct modular systems, and recruit the same networks in the left hemisphere for both domains in musicians, we would expect to see a decrease in performance due to competition for neural resources in the left hemisphere.

**Participants and Methods:** A language comprehension task and a visual search task were administered to 36 expert musicians and 36 matched non-musicians in the conditions of silence, piano music played correctly and piano music played incorrectly.

**Results:** Musicians performed significantly more poorly in the language comprehension task in the presence of background music in comparison to silence. In contrast to this, the performance of non-musicians was not affected by music. Additionally, music did not affect the performance of either group on the visual task.

**Conclusions:** Together the results suggest musicians have difficulty processing music and comprehending language at the same time. It is suggested this is due to neural coalescence of music and language in the musician brain as a result of music training from childhood. Additionally, musicians outperformed non-musicians on both tasks, reflecting either a general cognitive advantage in musicians or enhancement of more specific cognitive abilities.

Correspondence: *Lucy L. Patston, PhD, Psychology, The University of Auckland, Private Bag 92019, Auckland 1142, New Zealand. E-mail: l.patston@auckland.ac.nz*

**A.M. KILOV, L. TOCHER & E. POWER. Chatting online- exploring chatroom interactions of adults with and without TBI.**

**Objective:** There is emerging evidence to support use of the Internet for people with TBI. Although topical, there are few studies examining chatroom discourse of people with TBI. This study explores performance of adults with/out TBI in social chatroom discussions with unknown communication partners (UCPs).

**Participants and Methods:** 10 participants (18-65 years) with moderate-severe TBI participated in chatroom discussions with 2 UCPs of the same gender. There was also a group of 10 control participants without TBI or language/ learning difficulties who participated in chatroom discussions with 2 UCPs. Chatroom transcripts were analysed for descriptive and statistical differences on measures of productivity (total number of chatroom exchanges (TNE), total number of words (TNW) used, and mean word length (MWL) per chatroom exchange). Discourse and topic analyses will be reported in the future.

**Results:** Data analysis for productivity measures along with means and standard deviations are presented below. No significant differences ( $p > 0.05$ ) were observed between TBI and control participants for TNE (TBI: 53.00 +/- 28.36, Ctrl: 50.05 +/- 27.02), TNW used (TBI: 265.65 +/- 147.92, Ctrl: 273.50 +/- 152.29), and MWL per chatroom exchange (TBI: 6.87 +/- 2.29, Ctrl: 7.02 +/- 1.81). Similar results were found for their respective UCP teams for TNE (TBI CPs: 88.30 +/- 34.40, Ctrl CPs: 94.05 +/- 31.97), TNW used (TBI CPs: 465.70 +/- 186.22, Ctrl CPs: 473.95 +/- 176.96), and MWL per chatroom exchange (TBI CPs: 12.50 +/- 3.75, Ctrl CPs: 12.94 +/- 4.03).

**Conclusions:** This study is novel in documenting productivity measures of chatroom interactions of people with TBI. People with TBI appear to perform similarly to controls on simple language productivity measures, and there is no significant difference in productivity measures of their UCPs. However, further discourse analyses are required to determine whether there are functional and linguistic differences in the types of exchanges that people with/out TBI use in social chatroom discussions.

Correspondence: *Andrea M. Kilor, S Bleok, Cumberland Campus C42, The University of Sydney, Sydney, NSW 1525, Australia. E-mail: a\_kilor@hotmail.com*

#### **I.T. RODRIGUES & A. CASTRO-CALDAS. Action Verbal Fluency: Lexical Frequency and Level of Education.**

**Objective:** We investigated level of education-related performance in Action Verbal Fluency Test (AVFT) (Piatt et al. 1999) in 90 healthy participants. Qualitative analyses of the type of verbs and their lexical frequency was considered.

**Participants and Methods:** The study sample was comprised of 90 healthy participants divided in 3 groups according to the number of years of education. None of the subjects had an history of neurological or psychiatric disease. All participants were administered an AVFT. We used a Computerize Multifunctional Lexicon from the Contemporaneous Portuguese to evaluate lexical frequency of verb production and correlate it with the level of education. We also compare the influence of the literacy in the type of verbs that were produced. The total performance in the AVFT was compared among groups.

**Results:** There were no age ( $F=98,7$   $p=0.616$ ) or gender (Kruskal-Wallis=13.2,  $p=1.00$ ) differences between the 3 groups. To compare the performance of the 3 groups in the AVFT, Anova-One way test was used. High positive correlations were found between final score and years of education ( $r=0.69, p<0.0001$ ). Subjects with high education level produced more verbs and more abstract verbs. On the contrary, participants with just 4 years of education produced a majority of verbs associated with daily activities and high frequency items.

**Conclusions:** High level of education was associated with greater number of produced items. These items were more abstract, less contextualized and with fewer associations with daily life activities. This may indicate that word recovery strategies in these individuals are associate with distinctive cognitive processes. The existence of a wider vocabulary and different lexical organization may be explanations for it. Overall this study provides a novel addition to the existing literature on the qualitative analysis of AVFT and its importance for lexical access models in subjects with different levels of education.

Correspondence: *Ines T. Rodrigues, Institute of Health Sciences – The Catholic University of Portugal, Lisbon, Palma de Cima, Lisbon 1000, Portugal. E-mail: rodriguesines@hotmail.com*

#### **E. POWER & L. WORRALL. Transferring a National Research Program into Action in Aphasia Rehabilitation. A Knowledge Transfer and Exchange Plan.**

**Objective:** Reducing the knowledge-to-practice gap to improve consumer health outcomes is currently a key policy agenda of health services and research granting bodies worldwide. The Australian Apha-

sia Rehabilitation Pathway (AARP) is a consumer-focused evidence-based pathway for implementation by speech pathologists to improve outcomes for people with aphasia. It is being developed by the Centre for Clinical Research Excellence (CCRE) in Aphasia Rehabilitation through a national research program. However, creation of research evidence/clinical pathways does not necessarily lead to clinical implementation. The CCRE aimed to develop a Knowledge Transfer and Exchange (KTE) plan to formulate more strategic exchanges between research producers and users to maximize implementation of the AARP.

**Participants and Methods:** The CCRE research activities were systematically mapped onto 'The Knowledge-to-Action-Process Framework' (Graham et al., 2006). The framework contains Knowledge Creation, Knowledge Tailoring and implementation (Action Cycle) components based on planned-action theories. Using the CCRE framework as a basis, we then developed a KTE plan using the 'Knowledge translation planning tools for stroke researchers' (Landry et al., 2006).

**Results:** Through the mapping process we constructed our own framework that incorporated individual research studies, more synthesized systematic reviews and a user-friendly tool for clinical implementation, the AARP. The plan included strategies to maximize implementation of the AARP including encouraging co-produced research with stakeholder engagement through Aphasia Communities of Practice and Consumer Reference groups. The plan also contained KTE capacity building initiatives to enable individual researchers to develop their own KTE plans and utilize this information for future grant applications.

**Conclusions:** The plan represents a theoretically-motivated foundation for reducing the research-to-action gap in aphasia rehabilitation.

Correspondence: *Emma Power, East St, Lidcombe, NSW 2141, Australia. E-mail: emma.power@sydney.edu.au*

#### **L. TU, L. TOGHER & E. POWER. Assessing Communication Ability Following Traumatic Brain Injury: The Benefits of Using Multiple Perspectives.**

**Objective:** This study investigated the usefulness and complementarity of three perspectives in assessing a person's communication ability following a severe traumatic brain injury (TBI). These were: (1) discourse analysis (exchange structure analysis), (2) ratings of interactions by independent observers (the Adapted Global Social Impression Rating Scales, Adapted Measure of Participation in Conversation and Adapted Measure of Support in Conversation) and (3) self and others' perceptions of communication (La Trobe Communication Questionnaire).

**Participants and Methods:** Three discourse elicitation tasks (a casual conversation, purposeful conversation and problem solving task) were recorded involving a TBI participant with his mother and, on a separate occasion, with his paid caregiver. Texts were analysed using each of the perspectives.

**Results:** Discourse analysis showed the TBI participant's difficulties in giving and requesting information were influenced by both the communication partner and discourse task. Ratings by observers revealed that a purposeful conversation involving the TBI participant was more interesting, rewarding and less effortful with the mother than with the caregiver. Further, the purposeful conversation between the TBI participant and caregiver was judged less interesting, rewarding and more effortful than their casual conversation or problem solving task. Exchange structure analysis provided a communication profile of the TBI participant consistent with the ratings by independent observers. Self and others' perceptions of communication also revealed perceptions that appeared to motivate behaviours of communication partners.

**Conclusions:** Exchange structure analysis, ratings by independent observers and self and others' perceptions of communication are assessment tools that consider the communication context. Together, the three perspectives provided an extensive communication profile of a person with TBI and appear a promising, comprehensive approach for the examination of discourse ability following TBI.

Correspondence: *Lan Vy Tu, Masters of Speech-Language Pathology, Speech Pathology, C/- Leanne Togher, University of Sydney, East Street, Lidcombe, NSW 2141, Australia. E-mail: latu5513@uni.sydney.edu.au*

**M. MEINZER, T. FLAISCH, L. SEEDS, S. HARNISH & B. CROSSON. Task difficulty dependent activity modulation in bilateral inferior frontal cortices in young and old age during word-retrieval.**

**Objective:** Word-retrieval impairments are frequent in healthy aging and age-related pathological conditions. However, the neurofunctional basis of these impairments is largely elusive.

Previous functional imaging studies using word-retrieval tasks found enhanced activity in right prefrontal areas in healthy older compared to younger adults. However, more pronounced right hemisphere recruitment has primarily been observed during challenging task conditions (verbal fluency; Meinzer et al., 2009; in press), but rarely during relatively easy tasks (picture naming; Wierenga et al., 2008). Moreover, increased task difficulty results in enhanced activity in bilateral prefrontal areas in younger participants as well (Thompson-Schill et al., 1997). Thus, the question arises, whether increased activity in older participants is truly an age-related phenomenon or simply reflects increased processing load.

**Participants and Methods:** In the present study we parametrically manipulated task difficulty during semantic and phonemic word-generation and used fMRI to assess activity patterns in 16 healthy younger and 16 older adults.

**Results:** Participants in both age groups produced fewer correct responses during the more difficult task conditions. Overall, older participants produced fewer correct responses. Bilateral ventral prefrontal cortices (BAs 45/47) showed increased activity during the more difficult task conditions in both age groups. The degree of activity was correlated with performance across both age groups, fluency tasks and difficulty levels. Moreover, activity modulation (i.e., difficult vs. easy task conditions) was linearly correlated with the respective drop in performance across age groups and tasks.

**Conclusions:** In sum, irrespective of age, activity levels in bilateral frontal cortices are modulated by task performance which needs to be considered when interpreting activity patterns and changes in functional activity in healthy and pathological aging.

Correspondence: *Marcus Meinzer, Neurology, Charite, University Medicine, Bonhoefferweg 3, Berlin 10177, Germany. E-mail: marcus.meinzer@charite.de*

**Session 8:  
Dementia and Emotion**

**3:45–5:15 p.m.**

**S. HSIEH, O. PIGUET & J.R. HODGES. Are You Happy? Knowledge Of Words That Describe Emotions In Frontotemporal Dementia.**

**Objective:** Frontotemporal dementia (FTD) is a progressive neurodegenerative disease where impairment in the recognition of (particularly negative) emotions is seen in two subtypes: behavioural-variant FTD (bvFTD) and semantic dementia (SD). Most studies have used visual stimuli, such as photographs of facial expressions, which contain more negative than positive emotions (e.g., anger, fear, disgust, sad versus happy, surprise). Whether or not knowledge of words that describe emotions (e.g., fascinated, insulted etc) is impaired in FTD and whether the negative bias remains after stimuli are better equated has not been investigated.

**Participants and Methods:** Patients with FTD (bvFTD, n=10; SD, n=8), Alzheimer's disease (AD; n=10) and controls (n=15), completed two tasks: (1) Word Synonyms test which involved matching one of two emotion words with a target emotion word (e.g., whether 'betrayed' or 'terror' is synonymous with 'fear'); and (2) Word Association test which involved selection of words that were most strongly associated with a target emotion word (e.g., whether 'play' or 'run' was best associated with 'fear'). Participants also undertook a standardized facial emotion recognition test.

**Results:** As expected, both FTD subtypes were impaired in the recognition of negative facial expressions of emotions. In contrast, FTD pa-

tients were impaired on both the Word Synonyms and Word Association tasks for negative and positive emotion words. Scores on the Word Synonyms task correlated with the Ekman 60 Faces Test in both FTD subtypes. The AD group did not differ from controls in any of the emotion measures.

**Conclusions:** Results show that emotion deficits are striking in FTD in comparison to AD and extend to not only negative but also positive emotions. Findings suggest that the negative bias previously reported may be due to the nature of the stimuli that have been used rather than a true reflection of the emotion deficit in FTD.

Correspondence: *Sharpley Hsieh, Neuroscience Research Australia, Cnr Barker and Easy Streets, Randwick, Sydney, NSW 2031, Australia. E-mail: s.hsieh@neura.edu.au*

**L.J. TIPPETT, N. SAMOROW, S. BRUNEAU-HERMAN, V.M. HOGG & R. ROXBURGH. Recognition of Facial Emotional Expressions in Presymptomatic Huntington's Disease: Mediation by Mood?**

**Objective:** Deficits processing facial emotional expressions occur in symptomatic Huntington's disease (HD), but findings for pre-symptomatic HD (preHD) are mixed. We examined recognition of subtle emotional facial expressions, particularly disgust, in preHD, and whether mood mediates emotional recognition.

**Participants and Methods:** Seventeen preHD individuals and 18 matched controls identified emotions portrayed in 78 facial expressions. Face stimuli were based on Ekman faces. Six faces, each displaying 6 emotions (happy, sad, angry, disgust, fear, surprise) were morphed between each emotion and neutral. Two levels of expression were selected: 100% emotion and a morph with 50-70% identification accuracy by separate controls. Levels of anxiety, depression and outward irritability were measured.

**Results:** There was no significant effect of Group, or Group x Emotion interaction. Planned comparisons for disgust revealed the preHD group identified significantly fewer expressions of disgust than controls. The preHD group had significantly higher scores on Anxiety and Outward Irritability Scales. In the preHD group only, there were significant positive correlations between the Anxiety Scale and subtle disgust recognition and total emotion recognition score; and the Outward Irritability Scale and total recognition. PreHD participants with abnormal anxiety scores recognised more emotional expressions overall and more subtle expressions of disgust than preHD participants with normal anxiety scores. Similarly those with abnormal Outward Irritability Scores performed better on disgust and total recognition scores.

**Conclusions:** PreHD individuals are impaired at recognising disgust, but no other emotion, even with subtle emotional expressions. Anxiety and outward irritability mediate emotional recognition; higher levels improve performance. Anxiety may induce processing of more cues from the environment searching for threatening stimuli. High levels of outward irritability may result in greater sensitivity to faces perceived as critical.

Correspondence: *Lynette J. Tippett, PhD, Psychology, University of Auckland, Private Bag 92019, Auckland 1142, New Zealand. E-mail: l.tippett@auckland.ac.nz*

**O. PIGUET, L.D. GLEESON, S. LAH, L. MILLER & J.R. HODGES. Emotion Processing in Nonfluent Primary Progressive Aphasias and Alzheimer's Disease.**

**Objective:** Nonfluent primary progressive aphasias are generally divided into primary nonfluent aphasia (PNFA) and logopenic progressive aphasia (LPA), with distinct underlying pathology: PNFA belongs to the frontotemporal dementia spectrum whereas LPA is predominantly associated with Alzheimer pathology. Clinically, PNFA and LPA present with similar expressive language deficits and are difficult to differentiate in life. Facial emotion recognition is typically impaired in patients with Alzheimer's disease (AD). Whether performance on facial emotion recognition tasks differs in PNFA and LPA patients and whether LPA patients experience deficits that are similar to those observed in AD is unknown.

**Participants and Methods:** Fourteen PNFA, 12 LPA and 18 AD patients were recruited along with 38 age-education-matched healthy controls. Participants were administered four tasks measuring different aspects of emotion recognition: face perception, identity matching, emotion matching and emotion selection.

**Results:** Patient groups exhibited different performance profiles compared to controls on the emotion recognition tasks: LPA were impaired

on emotion matching and emotion selection tasks and AD were impaired on identity matching and emotion selection tasks. In contrast, PNFA were not significantly impaired on any of the tasks. These patterns of results remained essentially unchanged after controlling for face perception performance.

**Conclusions:** These results indicate that PNFA, LPA and AD patients show distinct profiles of deficits on tasks of facial emotion recognition. Our findings have clinical implications: They suggest that tests of emotion recognition discriminate PNFA from LPA and may be useful to identify the patients with AD pathology who can potentially benefit from the few therapeutic interventions (e.g., acetylcholinesterase inhibitors) currently available.

Correspondence: *Olivier Piguet, PhD, Olivier Piguet, NeuRA, Barker St, Randwick, NSW 2031, Australia. E-mail: o.piguet@neura.edu.au*

#### **F. FISHER, A. PAVLIS, S. BRINKMANN, R. MAULE & A. CHURCHYARD. Social Perception and Empathy in Huntington's Disease.**

**Objective:** Research has reported that persons with Huntington's Disease (PwHD) show impaired affect recognition, specifically of negative emotions. The current research aimed to prospectively investigate the presence of affect recognition deficits as well as difficulties in the appreciation of more subtle aspects of social communication (specifically the recognition of sarcasm and sincerity). It was hypothesised that people with symptomatic HD would perform worse than age- and sex-matched controls on tasks tapping emotion recognition and perceptions of social aspects of communication. It was also hypothesised that difficulty reading the emotions of others and appreciating the social nuances of interactions would be associated with reduced empathy.

**Participants and Methods:** Eleven PwHD and 11 age- and sex-matched healthy controls completed the ACE-R, CBI-R, selected TASIT subtests and an empathy questionnaire. Data were analysed using non-parametric methods.

**Results:** PwHD were significantly worse than healthy controls in terms of general cognitive functioning and behavioural functioning. PwHD also showed significantly poorer negative affect recognition. In contrast, no significant differences were apparent on tasks requiring participants to interpret sincere and sarcastic exchanges. Low levels of empathy in PwHD were significantly associated with high levels of behavioural dysfunction, but not with poor affect recognition.

**Conclusions:** Consistent with previous research, PwHD had specific difficulty recognising negative emotions. Despite a core affect recognition deficit, higher level social perception abilities appeared intact. The prospective nature of this research will potentially allow the tracking of degradation of these more subtle abilities over time.

Correspondence: *Fiona Fisher, Neuropsychology, Calvary Health Care Bethlehem, 476 Kooyong Road, Caulfield, VIC 3162, Australia. E-mail: fionaf@bethlehem.org.au*

#### **S. SAVAGE, P. LILLO, F. KUMFOR, M. HORNBERGER, O. PIGUET & J.R. HODGES. Emotion Perception in MND and FTD.**

**Objective:** Although considered initially a pure motor syndrome, recent evidence has shown that Motor Neurone Disease (MND) is a multisystem disease which can overlap with frontotemporal dementia (FTD). While only 15% of patients with MND develop frank FTD, up to 50% of cases exhibit some degree of cognitive impairment. Despite the fact that FTD patients experience prominent deficits in emotion perception and social cognition, very little investigation has been carried out in these domains in MND, and no study has directly compared FTD and MND patients.

**Participants and Methods:** Twenty-six patients with a diagnosis of MND (13 with co-existing FTD [FTD-MND] and 13 without dementia), 13 matched FTD patients and 28 age-matched, healthy controls completed a battery of cognitive and emotion perception tasks.

**Results:** Both MND (n=26) and FTD patient groups showed significant impairments in perceiving emotions compared to controls. However, after dividing MND patients into those without dementia and those with co-existing FTD, only the FTD-MND patients showed significant impairments on measures of emotion perception. FTD-MND and FTD patient groups displayed similar levels of impairment on emotion measures, even after controlling for measures of general cognition.

**Conclusions:** Patients with MND who also meet clinical criteria for FTD show significant deficits on tests of emotional processing, over and above deficits found on general tests of cognitive function. In this group, disturbance of emotion processing appears to be at least as severe as those seen in patients with FTD. Specific profiles within the MND groups will be discussed.

Correspondence: *Sharon Savage, FRONTIER, Neuroscience Research Australia, Hospital Road, Randwick, NSW 2031, Australia. E-mail: s.savage@neura.edu.au*

#### **A. AL SALMAN, S. WAHASS, A. RAHMAN ALTAHAN, H. BALUBAID, F. ALGERESHAN & J.J. EVANS. Validation of an Arabic Version of the Addenbrookes Cognitive Examination-Revised.**

**Objective:** Arabic is the official language of 26 countries and is the native language of more than 250 million people worldwide. However, there has been very little translation, adaptation or validation of Arabic forms of neuropsychological instruments. The Addenbrookes Cognitive Examination-Revised (ACE-R) is a brief cognitive screening tool that has been well validated in relation to the assessment of cognitive impairments associated with dementia. The present study involved the translation, adaptation and validation of an Arabic ACE-R. The study involved data collection from both literate and non-literate participants.

**Participants and Methods:** The ACE-R was translated into Arabic (and back-translated to check for accuracy). Some items were adapted for an Arabic cultural context. Data was collected from four groups: (1) Healthy literate participants (N=134); (2) Healthy illiterate participants (N=282); (3) Literate participants with a clinical diagnosis of Alzheimer's disease (AD) or Mild Cognitive Impairment (MCI) (N=32); (4) Illiterate patients with a clinical diagnosis of AD or MCI (N=159). Receiver Operating Curve (ROC) analyses were undertaken to examine the sensitivity and specificity of the Arabic ACE-R in the detection of participants with a clinical diagnosis (AD or MCI) from healthy participants.

**Results:** ROC analysis demonstrated that the Arabic ACE-R appears to have good sensitivity and specificity. For the literate sample, the Area Under Curve (AUC) statistic was 1.00, reflecting complete separation of patients and controls. For the illiterate sample, the AUC statistic was 0.996, reflecting very clear, although not complete, separation of the clinical and healthy participant samples.

**Conclusions:** The Arabic ACE-R appears to be a useful instrument for the assessment of cognitive impairment arising from a degenerative neurological condition. This project provides normative data for literate and illiterate samples, which is important given that high levels of illiteracy still exist in older persons in many countries.

Correspondence: *Jonathan J. Evans, PhD, Mental Health & Wellbeing, University of Glasgow, Academic Unit, Gartnavel Royal Hospital, 1055 Great Western Road, Glasgow G12 0XH, United Kingdom. E-mail: jonathan.evans@glasgow.ac.uk*



## FRIDAY MORNING, JULY 8, 2011

## Poster Session 2

(posters are available from 9am-5pm, however, authors will be presenting during morning tea, lunch break and afternoon tea) :

9:00 a.m.–5:00 p.m.

## ADHD/Attentional Functions

**K.D. HODGSON, A.D. HUTCHINSON & L.A. DENSON. Psychological Treatments for Attention Deficit Hyperactivity Disorder (ADHD): A Meta-Analysis of Paediatric Outcome Studies.**  
**Objective:** We expanded on the Fabiano et al. (2008) meta-analysis of behavioral treatments for ADHD, a neurobiological disorder presenting in childhood, by systematically comparing the efficacy of seven types of psychological intervention.

**Participants and Methods:** After a systematic literature search, we conducted a meta-analysis of 14 controlled treatment studies evaluating behavior modification, neurofeedback, multi-modal psychosocial treatment, school-based programs, working memory training, parent training and self-monitoring. Mean weighted effect sizes for the treatment outcomes of 625 children and adolescents (382 treatment, 243 controls) were calculated. Moderator analyses examined contributions of age, gender, ADHD subtype and treatment 'dosage' to outcomes.

**Results:** Two treatments were most supported by this evidence: behavior modification produced statistically significant improvement across the most outcome measures, and neurofeedback had the largest effect size. Treatments were generally more efficacious for girls than for boys, and least efficacious for the 'combined' ADHD subtype. There was no dose effect. Older children did not benefit more from treatment than younger children.

**Conclusions:** Our small study, based on limited literature, supports two psychological treatments for young people with ADHD and indicates directions for more, and better, evaluation research.

Correspondence: *Linley A. Denson, School of Psychology, Univ Adelaide, North Terrace, Adelaide, SA 5005, Australia. E-mail: linley.denson@adelaide.edu.au*

**J.M. HALPERIN, D.J. MARKS, A. CHACKO, J. CURCHACK, C. YOON, A. BEDARD & D. HEALEY. Training Executive Attention and Motor Skills (TEAMS): A Novel Intervention for Preschoolers with ADHD.**

**Objective:** To assess the effectiveness of a novel neurocognitive prevention intervention for preschoolers with ADHD that was designed to enhance brain development and yield enduring reductions in ADHD symptom severity.

**Participants and Methods:** 29 4 and 5 year-old children with ADHD and their parents participated in concurrently-run child (3-5 children/group) and parent groups. Child groups focused on an array of games targeting distinct neurocognitive domains including inhibitory control, working memory, motor control, set-shifting and planning/organization. Parents received education about ADHD coupled with instruction, modeling, and a description of the cognitive constructs tapped by each of the children's game. Parents were directed to spend at least 30 min. per day playing these games with their children and were instructed in how to individualize (i.e., scaffold) the games to their child's level of proficiency and progressively increase the cognitive/behavioral load of each game as their child achieved mastery of the requisite skill. Daily diaries were collected to measure time engaged in activities outside of sessions. Treatment palatability was evaluated, and parent and teacher ratings on the ADHD-RS-IV were assessed pre-treatment, post-treatment and at 1- and 3-month follow-up. Data are reported for 7 child groups.

**Results:** Only one child failed to complete the intervention, and session attendance was very high (92.7%). Mean daily playing at home was 35.3 min/day, and parent satisfaction ratings were quite high. Parent and teacher ratings on the ADHD-RS-IV significantly improved from pre- to post-treatment (both  $p < .01$ ), and behavioral gains reported by parents ( $p < .01$ ) and teachers ( $p < .05$ ) persisted 1- and 3-months post-treatment.

**Conclusions:** These data indicate that a structured play-based approach to neurocognitive training may be an effective treatment for preschoolers with ADHD. Double-blind, randomized controlled trials are beginning.

Correspondence: *Jeffrey M. Halperin, Ph.D., Psychology, Queens College, 65-30 Kissena Blvd., Flushing, NY 11367. E-mail: jeffrey.halperin@qc.cuny.edu*

## Assessment/Psychometrics/Methods (Child)

**R.M. ROBERTS, W.M. GEORGE, C. COLE, P. MARSHALL, V. ELLISON & H. FABEL. What Effect Does Age Correction Have On IQ Scores Among School Age Children Born Prematurely?**

**Objective:** In light of the risks of developmental and cognitive deficits associated with premature birth, it is important that the development of premature children is monitored. It is common clinical practice to correct the age of premature infants and children when assessing development in order to account for their prematurity. Previous research has focused on the impact of age-correction in developmental assessments of premature infants and toddlers. This study examined the effect of age-correction on IQ scores among premature school-aged children and its implications on the diagnosis of intellectual disability.

**Participants and Methods:** Eighty-one children aged five years were assessed with the WPPSI-III, and 177 children aged eight years were assessed with the WISC-IV.

**Results:** Results showed that corrected IQ scores were significantly higher than not-corrected IQ scores (Full Scale IQ and all indices) for both the WPPSI-III and WISC-IV. Specifically, when corrected age was used, there was an increase of approximately five IQ points for the WPPSI-III, and approximately one to two IQ points for the WISC-IV. There was a weak negative correlation between gestational age and IQ score difference. Age-correction did not affect IQ scores in terms of meeting diagnostic criteria for intellectual disability.

**Conclusions:** The present study provides some support for age-correction beyond infancy and early childhood (i.e., beyond two to three years of age). However, it is recommended that one should consider how the increase of a few IQ points could affect a child's eligibility for access to disability funding and services.

Correspondence: *Rachel M. Roberts, PhD, Psychology, Univ Adelaide, North Tce Campus, Adelaide, SA 5005, Australia. E-mail: rachel.roberts@adelaide.edu.au*

**S. SCRATCH, M.M. SPENCER-SMITH, N. BARRE, L. DOYLE & P.J. ANDERSON. Memory abilities in very preterm and very low birth weight children.**

**Objective:** Children born very preterm (VPT, <32 weeks' gestation) and very low birth weight (VLBW, <1500 grams) have been reported to display memory impairments; however, this is not a universal finding and no specific memory profile has not yet been established. This study aimed to test a conceptual framework of memory to describe the profile of memory impairments in VPT/VLBW children through a rigorous systematic review.

**Participants and Methods:** Electronic databases were used to systematically search the literature. Strict inclusion criteria were applied and seven studies qualified. Effect sizes were then calculated to compare outcomes for VPT/VLBW and term born groups.

**Results:** Five studies reported on verbal immediate memory and analyses revealed that VPT/VLBW children performed -0.53 SD below term born children. A similar pattern of outcome was observed for visuospatial immediate memory. Only one study reported on delayed memory, showing that VPT/VLBW performed similarly to term born children in both short and long delayed memory.

**Conclusions:** Few methodologically sound studies have examined memory function in VPT/VLBW children. Based on limited research, this systematic review suggests that being born VPT/VLBW significantly affects immediate memory abilities at school age. Furthermore, delayed memory may be intact in VPT/VLBW children at school age.

Correspondence: *Shannon Scratch, Murdoch Childrens Research Institute, Flemington Road, Parkville, VIC 3052, Australia. E-mail: s.scratch@pgrad.unimelb.edu.au*

## Autism Spectrum Disorders

### N. FAUZAN & M. NAZARUDDIN. Neurofeedback Treatment for Attention and Behavioral Problems: A Case of Mild Autism.

**Objective:** The objective of this case study is to look at the efficacy of Neurofeedback treatment on a child with autism.

**Participants and Methods:** This is a case study to assess the efficacy of Neurofeedback Treatment on a 9 year old boy who was diagnosed with mild autism. The two main protocols included primarily Beta and Alpha training.

**Results:** Treatment efficacy was analyzed by calculating difference scores between pre- and post-treatment clinical scores. The difference between the scores on ATEC scores and T.O.V.A. suggest therapeutic changes in the NFT subject.

Following treatment, the ATEC scores decreased indicating an improvement in the behavior change and an increase in the T.O.V.A scores which indicates an increase in attention. At the time of this writing, there are more sessions to go to see more significant improvement in other areas such as speech etc. Observation and interview shows significant changes in sleeping patterns after his first three sessions of training. He engaged in conversation instead of just one word response and had been affectionate with his siblings. He began attending to the trainer and reacting to others. He started making eye contact, more affectionate and reaches for hugs.

**Conclusions:** The efficacy of NFT in this case study could be expected in conjunction with other therapies such as speech therapy, auditory integration training and nutritional therapy as the natural ways to manage their developmental and neurological disorders.

Correspondence: *Norsiah Fauzan, Cognitive Psychology, Department of Cognitive Science, University of Malaysia Sarawak, Faculty of Cognitive Science and Human Development, University of Malaysia Sarawak, Kota Samarahan 94300, Malaysia. E-mail: fnorsiah@fcs.unimas.my*

## Cognitive Intervention/Rehabilitation

### S. BACKHAUS, S. IBARRA, D. PARROTT, K. CAPPA & J. MALEC. Comparison of Cognitive-Behavioral Therapy and A Self-Directed Treatment Group on Self-Efficacy and Neurobehavioral Functioning in Brain Injury Survivors and their Caregivers.

**Objective:** Clinicians seek to understand which types of treatments are most beneficial for individuals with brain injuries (BI). The purpose of this study was to compare two groups (Manualized Cognitive-Behavior Treatment or CBT versus Self-Directed) on the effects of Perceived Self-Efficacy (PSE) and neurobehavioral functioning.

**Participants and Methods:** Thirty-eight individuals were recruited from an outpatient rehabilitation facility (19 with brain injury and their caregivers). Subjects were randomly assigned to groups who met for 16 weeks. PSE and neurobehavioral functioning were measured at baseline, immediately following intervention, as well as 3-month follow-up.

**Results:** ANCOVA showed significantly improved PSE for both groups with no significant difference between them at immediate post-treatment ( $F=2.24$ ;  $p=.143$ ). ANCOVAs also revealed a significant difference between the groups on disinhibition ( $F=5.34$ ;  $p=.035$ ), and a trend for apathy at immediate post-treatment ( $t=1.80$ ;  $p=.097$ ), with the CBT group showing more improvement.

**Conclusions:** This study showed that both types of treatment can improve PSE, but that only CBT results in significant reductions in disinhibited behaviors such as irritability, anger, emotional lability, and impulsivity. Specifically, in the Self-Directed group, individuals overtly voiced motivation to improve, utilized a Menu of Topics to review from, and independently presented research on these topics on a weekly basis (something not expected from the usual 'support group'). Implications of when and for what purpose CBT treatment is used will be discussed, as this study showed that one therapy did not 'fit all' as some clinicians have assumed when using CBT. Perhaps, "social competition or rivalry" may greatly influence self-efficacy. In contrast, social competition was not as helpful as CBT in improving neurobehavioral challenges which affect family functioning and increase caregiver burden. Implications will be discussed.

Correspondence: *Samantha Backhaus, Ph.D., Neuropsychology, Rehabilitation Hospital of Indiana, 9531 Valparaiso Ct., Indianapolis, IN 46268. E-mail: samantha.backhaus@rhin.com*

### C.L. BEST, M.B. MARSDEN & C. MOYLE. Increasing Social Independence Through Client Centered Group Based Social Skills Therapy For Young Adults With An Acquired Brain Injury.

**Objective:** Initial therapy interventions following an acquired brain injury are often based on the most obvious deficits for a client such as physical wellbeing; occupational outcomes; functional communication and legal/welfare matters. Not until relationships are negatively affected and support networks diminished, the impact of reduced social skills are recognised and addressed.

Many of our clients reported social isolation and loneliness without an understanding of why these changes occurred. This resulted in an increase in mental health issues and reduced quality of life.

A ten week multi-disciplinary program was developed and commenced with client input of their difficulties and establishing their own goals. The aim of the program was to increase clients pro social skills and communication skills whilst reducing adverse behaviour and inappropriate interactions out in the community.

**Participants and Methods:** Participants were aged between 18 - 65, both male and female from a wide range of socio economic backgrounds. All participants had suffered an acquired brain injury.

Intervention included role plays, slide shows, information handouts, functional homework tasks, accessing the community and transference of skills to real life situations. Participants had ongoing access to a Psychologist should they need it.

**Results:** A communication skills questionnaire was used to obtain pre and post measurements of social awareness and deficits. Knowledge was assessed through written evaluation and informal observations of participants' social behaviour were obtained.

The therapy program proved successful with positive outcomes noted across a range of social settings

**Conclusions:** The program has been shown to be a valuable service in the holistic rehabilitation of our clients. Recognising that the social goals of a nineteen year old single female are very different to those of a fifty two year old father of three, the program is adapted accordingly with each delivery depending on the cohort.

Correspondence: *Cassandra L. Best, BSc; BPsych; Grad Dip Ed, Brightwater Care Group, 170 Swansea Street (east), East Victoria Park, Perth, WA 6101, Australia. E-mail: cassandra.best@brightwatergroup.com*

### C.Y. DURHAM, P. RAMCHARAN & J. LANG. The Learning Experience of People with Brain Injury.

**Objective:** Freeman states 'long term recovery from brain injury is not a medical problem. What is needed is re-learning.'

One objective of the innovative study 'Keys to the Brain Injury Cage' was to employ educational learning principles (of engagement, motivation, different ways of learning/understanding) to encourage people with brain injury to reflect and provide insight into their acquisition of knowledge, learning and understanding about brain injury and the method employed to transfer this knowledge. Note the researcher has brain injury.

**Participants and Methods:** Participants included 33 people with brain injury. 23 participated by viewing a CD and completing 'What Brain Injury means to me' sheets, 10 also participated in an interview/guided conversation using the metaphor/tool, 10 participated only in the interview. In addition 5 carers and 5 professionals were interviewed. Transcripts were analyzed using Interpretative Phenomenological Analysis.

**Results:** Participants identified helpful information, and information that, on reflection, would have been helpful. Completion of transcript analysis identified the crucial role learning/ information transfer plays in the reconstruction of self following brain injury. Memory and cognition problems, shame and self-esteem difficulties, depression and feelings of isolation, can affect understanding and making sense of information given.

**Conclusions:** Families of brain injured people experience difficulty hearing and understanding information, and, like people with brain injury want appropriate and meaningful information in non-medical

language: 'take home' information about brain injury, resulting health problems, emotional impact of brain injury, suicide risk, positive stories of other people's experiences, information about support/government services. They also require hand out information to inform the general public, schools and police.

Further consideration of the translation and transfer of information needs to be given.

Correspondence: *Christine Y. Durham, M.Ed, Health Sciences, RMIT University, 28 Porter Street, Eltham, VIC 3095, Australia. E-mail: christine.durham@student.rmit.edu.au*

**O. GARCIA SANCHEZ, C. GONZALEZ AGUDO & S. FERNANDEZ GUINEA. Prognostic factors in the effectiveness of neuropsychological rehabilitation programs.**

**Objective:** Going deeper on the concept of "Neuropsychological Rehabilitation" in patients with acquired brain injury in subacute, we should understand it as a series of compensatory strategies that can be used to facilitate the daily living. We analyze the progression of our patients in terms of quantitative neuropsychological tests, neurobehavioural and cognitive measures, aiming to achieve a functional increase and a reduction of neurobehavioural alterations.

Neuropsychological programs should from a holistic perspective focused on the individual as the center of treatment. Measure the effectiveness of our program of neuropsychology is the aim of our study, analyzing factors of good and poor prognosis.

**Participants and Methods:** 10 patients with acquired brain injury (with an average of 3 years) were assessed at admission and discharge to a comprehensive rehabilitation program by means of a neuropsychological battery that included measures of overall cognitive functioning, attention, memory and executive function. They received an individual session and five groups (memory, attention-perception, emotional expression, processing speed and social skills) once per week for 3 years.

**Results:** The most significant differences occurred in attention, processing speed, comprehension, planning and sequencing of activities, improved recall, reduced neurobehavioral factors most disruptive and knowledge of their deficit. We do not find significant differences with respect to the awareness implication and the future of their deficit, cognitive rigidity, perseveration, and levels of self-regulation, but functionally these deficits have been offset by an external control.

**Conclusions:** To complete our investigation would be necessary to analyze prognostic factors, which include both personal factors (premorbid personality and coping system), social (family structure and social interaction), physicians (associated diseases and risk factors).

Correspondence: *Olga Garcia Sanchez, POLIBEA, GARDENIAS 1 5 C, Madrid 28925, Spain. E-mail: olgagarsan@hotmail.com*

**A. JANSARI, D. FROGGATT, L. DAWKINS & T. EDGINTON. The Cognitive Enhancement of Executive Functions by Nicotine: A Study Using Virtual Reality.**

**Objective:** Nicotine is known to enhance aspects of cognitive functioning in abstinent smokers but the effects on specific areas of executive functions, and in non-smokers are inconclusive. One important factor contributing to the lack of clear empirical evidence for the impact of nicotine has been the poor sensitivity of the tests used to assess executive functions. This study used a new virtual reality assessment of executive functions known as JAAM© to address this issue.

**Participants and Methods:** In a 2x2 design manipulating group (smokers and non-smokers) and drug (nicotine and placebo), 72 participants performed a number of tasks after chewing a gum containing either nicotine or placebo. Components of executive function were measured using three traditional tests, the Letter-Number Sequencing Test, the FAS and the Continuous Performance Test as well as JAAM© which assesses eight cognitive constructs simultaneously as well as providing an overall performance measure.

**Results:** Only one measure out of seven from the traditional tests (CPT distractor errors) showed a difference between the nicotine and placebo groups. In contrast, JAAM© revealed significant main effects of group and drug as well as an interaction between these two factors. Abstinent smokers performed worse than non-smokers and nicotine improved performance in both groups. Further, nicotine had a specific impact on all three aspects of prospective memory.

**Conclusions:** Nicotine does enhance executive functions both in smokers and non-smokers. JAAM© seems to be a more sensitive measure of executive functions than traditional tests and could be used in exploring further the facilitative impact of nicotine in individuals with attention-based cognitive deficits such as schizophrenia and ADHD (Evans & Drobos, 2008). Finally it may point a way forward for the use of nicotine in the development of drug-treatment for a number of disorders involving a primary deficit of prospective-memory including Alzheimer's and Parkinson's.

Correspondence: *Ashok Jansari, School of Psychology, University of East London, Water Lane, London E15 4LZ, United Kingdom. E-mail: a.jansari@uel.ac.uk*

**N. MOHAN. Examining the Nature of Resilience and Executive Functioning in People with Brain Injury and People with Multiple Sclerosis.**

**Objective:** This study describes, identifies, measures and nurtures traits of resilience and executive functioning in people with Traumatic Brain Injury (TBI) and people with Multiple Sclerosis (MS).

**Participants and Methods:** Ten participants with traumatic brain injury; 6 males, 4 females, (Mean Age = 42 years, SD =6.23) and (b) ten with Multiple Sclerosis, 3 Males, 7 Females (M =44, SD = 10.80) underwent a six month individualized psychosocial intervention. The intervention was based on principles of person centred and cognitive behaviour therapy. Outcome data were collected using the Resilience Scale, the Dysexecutive Functioning Questionnaire (DEX), and Goal Attainment Scaling (GAS) on three occasions; (01) baseline, (02) post intervention and (03) at six months follow up.

**Results:** Statistical analysis of scores indicates that there was a significant correlation between executive functioning and resilient behaviours. As resilience improved for the MS group, so did executive functioning abilities. Significant improvements in resilience scores post intervention were reported by both groups. However, due to the severity of cognitive impairments in participants with TBI, an increase in DEX scores post intervention was not obtained. Despite low scores, significant behavioural changes were identified. Amongst them was the ability to set and persist at tasks, set goals, demonstrate insight and the ability to problem solve. The presence of resilient behaviour was heavily dependent on the availability of support and on participants' mood states.

**Conclusions:** Given the right circumstances and support, even the most impaired were capable of resilient behaviour which in turn, was motivating for them and inspiring for their family and friends.

Correspondence: *Nivashinie Mohan, Phd, Pantai Hospital Ampang, B2-2A Aastana Damansara Condo, Jalan 17/1, Petaling Jaya 46400, Malaysia. E-mail: nivamohan@gmail.com*

**M. SHIBASAKI & M. YOSHIZAWA. Cognitive Rehabilitation for Activation Deficit in a Patient with Frontal Lobe Lesions: ANIRS Study.**

**Objective:** Medial frontal lobe lesions frequently impair activation, which plays a key role in generating and sustaining any response or mental processes. This study investigated the effectiveness of cognitive rehabilitation for activation deficit in a patient with frontal lobe lesions by using near-infrared spectroscopy (NIRS) and behavioral measurement.

**Participants and Methods:** OT, a 39-year-old right-handed man who exhibited chronic severe activation impairment due to bilateral frontal lobe lesions, underwent a 4-month cognitive rehabilitation. Visual search tasks were used for assessment and training in order to improve OT's spontaneous attention shifts and delayed response to stimuli. The target behaviors of the rehabilitation were decreases in miss rates and reaction times (RTs) to the targets in the assessment tasks. The prefrontal activity during assessment tasks was measured using a double-channel NIRS device before and after training and after a 2-month follow-up.

**Results:** OT's miss rates and RTs decreased after the training, and this effect was maintained in the follow-up. NIRS revealed that OT's prefrontal total-Hb significantly increased after the training. In addition, we observed marked total- and oxy-Hb increases in the first 10 seconds of the assessment task after the training, which suggested an improvement of responsivity in OT's prefrontal area.

**Conclusions:** Cognitive rehabilitation for activation deficit not only improved behavioral measures but also prefrontal activity measured by NIRS. This result also suggests that cognitive rehabilitation intervention can produce plastic changes in the brain of chronic patients with acquired brain injuries.

Correspondence: *Mitsuyo Shibasaki, Psychology, Meisei University, 2-1-1, Hodokubo, Hino City, Tokyo 191-8506, Japan. E-mail: mitsuyo@psy.meisei-u.ac.jp*

**A. WELFRINGER, G. LEIFERT-FIEBACH, R. BABINSKY & T. BRANDT. Visuomotor imagery as a new tool in the rehabilitation of neglect: A randomized controlled study of feasibility and efficacy.**

**Objective:** The aim of this study was to investigate the feasibility of mental practice of positions and movements of the contralesional upper limb in subacute neglect patients and the efficacy of the approach in modifying visuospatial and representational neglect symptoms.

**Participants and Methods:** Fifteen subacute neglect patients received two daily half-hour sessions of visuomotor imagery therapy over a three-week period as an add-on treatment and were compared to a control group of 15 subacute neglect patients without supplementary therapy. Feasibility was assessed using verbal-feedback protocols. Efficacy was determined using various standardized functional-outcome measures and neuropsychological tests.

**Results:** According to therapy protocols, compliance and subjective-gain ratings were high. The results suggest that imagined activation of the contralesional upper limb significantly reduces the severity of neglect in drawing/copying tasks as well as enhancing sensation in the affected arm.

**Conclusions:** We conclude that (i) kinaesthetic visuomotor imagery is a feasible technique for subacute neglect patients and that (ii) imagery practice leads to improvements in the perception of body and space. Future research is required to specify criteria for indication and contraindication.

Correspondence: *Anouk Welfringer, Neuropsychology, Kliniken Schmieder, Speyererhof, Heidelberg 69117, Germany. E-mail: anoukwelfringer@gmail.com*

## Epilepsy/Seizures

**M. KALDOJA & A. KOLK. Social Skills and Social Cognition in Children with Newly Diagnosed Epilepsy.**

**Objective:** Epilepsy is a serious neurological disorder which affects 1-3% of the population, still so far limited attention has been dedicated to social cognition and social skills in children with epilepsy.

**Participants and Methods:** 20 7-12 (9.48±1.91) year old children (11 boys and 9 girls) with newly diagnosed generalized or focal epilepsy, who had not yet started anti-epileptic treatment and 50 controls (9.46±1.45) were included in the study. Social Skills Rating System (Gresham & Elliot, 1990) and Social Cognition Questionnaire (Salzman-Beniah & Lalonde, 2007), a parent completed questionnaires, were used to evaluate social skills and social cognition. The study was carried out in Tartu University Hospital's Children's Clinic in between 01.09.2008-01.09.2010.

**Results:** We found that compared to controls, children with epilepsy were reported to have more difficulties in social cognition ( $t=-2.59$ ,  $df=68$ ,  $p=.012$ ) and social skills ( $t=-3.87$ ,  $df=68$ ,  $p=.00$ ). They also exhibited more problem behaviors ( $t=4.79$ ,  $df=68$ ,  $p=.00$ ). Difficulties in social skills were most evident in self-control ( $p=.00$ ). Internalizing problems were reported as the most common problem behaviors in patients ( $p=.001$ ). In patients, lower social cognition was highly correlated with higher amount of behavioral problems ( $r=-.542$ ,  $p=.14$ ), while in controls social cognition was moderately positively associated with social skills ( $r=.303$ ,  $p=.29$ ) and higher social skills were negatively associated with behavioral problems ( $r=-0.353$ ,  $p=.012$ ).

**Conclusions:** Compared to healthy peers, children with newly diagnosed epilepsy show more behavioral problems and are inferior in their social cognition and social skills. In epileptic children, worse social cognition is associated with higher amount of behavioral difficulties, suggesting that the underlying brain pathology per se has a negative effect on social cognition and behavior.

Correspondence: *Mari-Liis Kaldoja, MSc, Neurology and Neurorehabilitation, Tartu University Hospital Children's Clinic, Lunini 6, Tartu 51014, Estonia. E-mail: mari-liis.kaldoja@kliinikum.ee*

## Genetics/Genetic Disorders

**D.R. HOCKING & K.M. CORNISH. Selective Spatial Processing Deficits in an at-risk Subgroup of the Fragile X Premutation.**

**Objective:** Recent findings suggest that males with the fragile X premutation show a neurocognitive signature of inhibitory and working memory decline that progressively deteriorates with increasing age. Fragile X premutation males have moderate expansions of the trinucleotide CCG repeat region of the FMR1 gene that may have neurotoxic effects in specific neural regions. Some carriers of the fragile X premutation are at-risk for a late-onset neurodegenerative disorder, fragile X-associated tremor/ataxia syndrome (FXTAS). To further characterise the cognitive signature in carriers without concomitant FXTAS, we determined whether males with the fragile X premutation show a higher CCG repeat threshold within which a subgroup may be especially vulnerable to selective spatial processing impairments.

**Participants and Methods:** Forty males with fragile X premutation aged 18-69 years underwent neuropsychological tests of visual-perceptual and spatial processing. We examined differences between males with the fragile X premutation (without concomitant FXTAS) in the upper (>100 CCG repeats) and lower (<100 CCG repeats) premutation range.

**Results:** The results demonstrate that male premutation carriers with CCG repeat expansions in the upper size range of the premutation performed more poorly on tests of complex visuospatial processing than both males with normal alleles and lower premutation ranges. No differences were apparent on measures of visual-perceptual processing.

**Conclusions:** These findings suggest that the neurotoxic effects of larger CCG repeat sizes may initially affect vulnerable dorsal stream regions associated with complex visuospatial processing.

Correspondence: *Darren R. Hocking, PhD, School of Psychology and Psychiatry, Clayton Road, Clayton, VIC 3800, Australia. E-mail: Darren.Hocking@monash.edu*

## Learning Disabilities/Academic Skills

**C. CRUZ RODRIGUES, G.A. MOREIRA, C.J. TOLEDO-PIZA, T. BARBOSA, S. TUFIK & O.A. BUENO. Polysomnographic Characteristics Of Children With Dyslexia.**

**Objective:** Learning processes are clearly influenced by different factors. Studies have shown the interference of sleep on learning and referred to behavioral changes in children with sleep disordered breathing (SDB). However, few studies have explored the occurrence of sleep disorders (SD) in children with dyslexia. Objective: the present study aims to investigate possible changes in sleep patterns in dyslexia.

**Participants and Methods:** 73 children with age ranging from 8 to 15 years, were submitted to neuropsychological (three sessions) and polysomnographic assessment (two consecutive nights). The sample was divided into two groups: CG (control group), composed of 34 children (20 males) with no referral or diagnosis of learning difficulties; and EG (experimental group), composed of 39 children (27 males) diagnosed with dyslexia, according to DSM IV-R criterias. Statistical analysis was conducted using t-Student test.

**Results:** The analysis of the polysomnography (PSG) data revealed significant differences between nights 1 and 2. However, no differences were found between groups on the second PSG night ( $p \leq 0.05$ ).

**Conclusions:** Such findings indicate that the investigation of sleep complaints, through questionnaires or a PSG evaluation, can be very useful tools in an interdisciplinary assessment, since they corroborate for a differential diagnosis.

Correspondence: *Camila Cruz Rodrigues, PhD, Psychobiology, UNIFESP/ EPM, Rua Embaú, 54, São Paulo 04039060, Brazil. E-mail: camilacruzrodrigues@hotmail.com*

**C. CRUZ RODRIGUES, C.J. TOLEDO-PIZA, T. BARBOSA & O.A. BUENO. Neuropsychological Characteristics Of Children With Dyslexia.**

**Objective:** Learning disabilities (LD) are characterized by heterogenic profiles. Such fact supports the need of better understanding underpinning neuropsychological characteristics associated to different LD, in order to contribute to the identification of comorbidities and a more precise diagnosis and intervention program. The present study aims to investigate neuropsychological characteristics of dyslexia.

**Participants and Methods:** 73 children, with ages rang from 8 to 15 years, were submitted to a neuropsychological evaluation. The sample was divided into two groups: CG (control group), composed of 34 children (20 male) with no referral or diagnosis of learning difficulties; and EG (experimental group), composed of 39 children (27 males) diagnosed with dyslexia, according to DSM IV-R criteria. Statistical analysis was conducted using General Linear Model equations (GLM), co-varied to FSIQ (Full scale Intelligence Quoefficient) scores.

**Results:** Results demonstrated significant differences between groups on the following neuropsychological variables: reading, spelling, mathematics and overall (total) scores ( $p \leq 0.0001$ ); digits forward and backward ( $p \leq 0.005$ ); semantic fluency (animal and fruit) ( $p \leq 0.003$ ); letter fluency in letters F, A and FAS ( $p \leq 0.05$ ); number of categories and number of total cards in the WCST ( $p \leq 0.05$ ), left and right discrimination (in self and in other people) ( $p \leq 0.001$ ).

**Conclusions:** Such findings indicate that deficits observed in children with dyslexia are related to difficulties in executive functions, working memory and semantic memory, which reinforces the idea that intervention programs should emphasize not only phonological abilities, but also other underpinning components that interfere on their overall achievement.

Correspondence: *Camila Cruz Rodrigues, Phd, Psychobiology, UNIFESP/EPM, Rua Embaú, 54, São Paulo 04039060, Brazil. E-mail: camilacruzrodrigues@hotmail.com*

**G.S. LEO, A.M. MORROW, J.M. MACEY & F. BARZI. Educational Outcomes for Children with Moderate to Severe Acquired Brain Injury.**

**Objective:** Acquired brain injury (ABI) in childhood can result in cognitive and behavioural impairment. School attendance is a core social activity for children. We conducted a medical chart review to describe educational and neuropsychological outcomes for children with moderate to severe acquired brain injury attending our service.

**Participants and Methods:** Eligible cases were identified from the database of a paediatric brain injury service in New South Wales, Australia (2003-2007). We reviewed the most recent 100 children aged 8-16 years with moderate or severe ABI. Children with previous behavioural or learning difficulties were excluded. Data were collected at 6, 12 and 24 months post injury. Variables included patient demographics, school placement, and neuropsychological testing. Linear regression examined variables predictive of educational outcomes.

**Results:** Participants included 49 children with severe ABI (Glasgow Coma Scale  $\leq 8$  or Post Traumatic Amnesia  $\geq 7$  days), 38 were female and 60 children aged 8-12 years old. Return to full time schooling was 54% at 6 months post-injury, 82% at 12 months and 88% at 24 months. Provision of an aide or special curriculum was received by 15% of children. We present preliminary analysis of our data.

**Conclusions:** We describe the educational and neuropsychological outcomes for our population of school-aged children with ABI. This case review improves our understanding of the increased needs of children following ABI. This has important implications for service delivery. Adequate resources and appropriate referrals to services are needed to promote successful return to full time schooling following ABI.

Correspondence: *Grace S. Leo, Kids Rehabilitation, The Children's Hospital at Westmead, The Children's Hospital at Westmead, Locked Bag 4001, Westmead, NSW 2145, Australia. E-mail: emailgraceleo@gmail.com*

**Psychopathology/Neuropsychiatry (Other)**

**A. OLLEY, P. SACHDEV & G. MALHI. Evidence of Disrupted Decision Making in Obsessive Compulsive Disorder: A Neuropsychological Evaluation of the Cognitive Building Blocks of Decision Making.**

**Objective:** Chronic indecision is characteristic of OCD yet decision making (DM) as a cognitive construct has been little studied. As DM is un-

derscored by multiple cognitive processes, the current study sought primarily to examine these cognitive building blocks and assess their impact on the proposed Decision Making Model (Sachdev and Malhi, 2005). It was hypothesised that OCD participants would demonstrate increased response latencies, perseverative responding, poor response inhibition and difficulties in adaptive behaviour, and a failure of organisational strategy implementation, with secondary effects on memory. Such deficits were predicted to be independent of symptom severity and mood-state, however related to DM style.

**Participants and Methods:** Thirty OCD and 30 Healthy Control (HC) participants, group matched for age, gender, and NART FSIQ, completed clinical scales of OCD, mood and DM style, and a battery of neuropsychological tests targeting information processing, visuospatial analysis, memory, and executive functioning. Dependent variables were grouped into 10 cognitive domains for analysis.

**Results:** As predicted, OCD participants underperformed in the domains of Information Processing ( $p = .002$ ) and Visuospatial Analysis ( $p = .006$ ), with subsequent poor Visual Learning and Memory ( $p = .004$ ), with a moderate effect size ( $r > .30$ ) and independent of symptom severity and mood state. However, Attention, Working Memory, Verbal Memory, Inhibition, Reasoning and Errors did not differ significantly. Avoidant DM style correlated with visual memory ( $r = .47$ ,  $p = .048$ ).

**Conclusions:** Using a domain analysis approach, the cognitive profile of OCD was confirmed as a subtle global reduction characterised by slow processing, and poor visuospatial analysis and memory. Such deficits are likely to impact on timely and accurate perception and organisation of material necessary for efficient decision making, despite intact reasoning and problem solving skills. The results support further examination of the Decision Making Model of OCD.

Correspondence: *Amanda Olley, Master of Clinical Neuropsychology, Psychiatry, University of New South Wales, Euroa Centre, Prince of Wales Hospital, Randwick, NSW 2031, Australia. E-mail: amanda.olley@gmail.com*

**Psychopathology/Neuropsychiatry (Schizophrenia)**

**M. HUA, Y. WU, S. CHIANG & H. HWU. Verbatim and Gist Memory in Patients with Chronic Schizophrenia.**

**Objective:** Impaired memory has often been reported in schizophrenia. However, little has approached effects of verbatim and gist memory, or false alarm on patients' poor memory functioning. Using the Deese-Roediger-McDermott (DRM) paradigm task, this study was to explore their constructive process of memory.

**Participants and Methods:** Forty patients with chronic schizophrenia and 30 healthy normal controls, matched for demographic variables, participated in the study. Each participant received a battery of neuropsychological tests, primarily including intelligence, memory, attention, language and perception, and the DRM paradigm task.

**Results:** The patients evidenced deficits of attention, episodic memory, and executive and intellectual function. On the DRM paradigm task, the mean gist memory score of patients was significantly lower than that of normal controls while mean verbatim memory and unrelated false alarm scores of patients were compatible with those of normal subjects.

**Conclusions:** Based on the results, our patients with chronic schizophrenia evidenced defective gist memory functioning in the context of relatively normal item-specific recognition ability. The defective picture implicates the dysfunction of semantic system mainly associated with neuropathological changes of temporal-related structures. We thus suggest that the neurocognitive retraining program taking advantage of patients' secure strength of verbatim recognition might enhance their remedial outcome.

Correspondence: *Mau-Sun Hua, Ph.D., Psychology, National Taiwan University, 1, Sec. 4 Roosevelt Road, Taipei 10617, Taiwan. E-mail: huams@ntu.edu.tw*

**M. HUA, C. CHIU, H. HWU, C. LIU & W. CHEN. Are There Core Neurocognitive Deficits Specific to Patients with Schizophrenia.**

**Objective:** Based on the reference of normal healthy subjects, impaired memory, attention, executive function and processing speed have been

reported to be core neurocognitive features of schizophrenia. However, in light of the heterogeneity of the disease and the issue regarding whether these cognitive deficits are specific to the patients, it seems immature to draw such a conclusion. This study was thus to investigate the issue of specificity of core neurocognitive deficits in patients with schizophrenia.

**Participants and Methods:** Forty-nine patients with first episode psychosis (FEP), 34 non-psychotic patients (NPP) predominantly with anxiety or depressive disorders, and 137 healthy controls (HCs), were recruited in the study. Each participant received a neuropsychological test battery including memory, attention, executive function, processing speed, and intelligence measures.

**Results:** FEP patients evidenced impaired general intelligence, verbal memory, executive function, and processing speed compared to HCs. However, only performance scores of the Trail Making Tests (TMT) A and B respectively measuring processing speed and executive function could differentiate FEP from NPP by group comparisons. Further ROC analyses on these test performances in FEP and NPP showed that specificities were low (.62 for TMT-A; .65 for TMT-B) when the sensitivities were set at .80.

**Conclusions:** Patients with FEP evidenced multi-domain neuropsychological deficits. However, most of them were not specific to schizophrenia. It appears that psychotic and non-psychotic patients might have considerably in common in neuropathology. We thus suggest that a caveat should be taken with care for the clinical utility of the concept of core neurocognitive deficits commonly reported in the literature of schizophrenia.

Correspondence: *Mau-Sun Hua, Ph.D., Psychology, National Taiwan University, 1, Sec. 4 Roosevelt Road, Taipei 10617, Taiwan. E-mail: huams@ntu.edu.tw*

**M. KIM, S. OH & K. JANG. An electrophysiological study of cognitive inhibition in college students with schizotypal traits.**

**Objective:** This study investigated cognitive inhibition in nonclinical individuals with schizotypal traits using Stroop task and event-related potentials (ERPs).

**Participants and Methods:** The schizotypal trait ( $n=14$ ) and control ( $n=15$ ) groups were selected based on scores of Schizotypal Personality Questionnaire (SPQ). The Stroop task consisted of three conditions: congruent condition (color words written in the same color as the meaning of the word), incongruent condition (words written in the color not matching the word meaning), neutral condition (words not describing color). EEG was collected at 64 channels and segmented into 1000ms epoch and averaged for each condition. Mean amplitudes of 300-400ms (N400) and 600-700ms (sustained potential: SP) time windows were analyzed by ANOVA, repeated measure, mixed design.

**Results:** There was a main effect of condition in terms of response time (RT) ( $F_{2,54}=87.55, p<.0001$ ) and accuracy ( $F_{2,54}=33.62, p<.0001$ ). The incongruent condition elicited prolonged RT and less accuracy than congruent and neutral conditions. For N400, there were main effects of condition ( $F_{2,54}=23.95, p<.0001$ ), channel ( $F_{7,189}=4.11, p<.01$ ) and an interaction effect of group by condition ( $F_{2,54}=3.48, p<.05$ ). For control group, incongruent condition elicited greater N400 amplitude than congruent and neutral conditions, whereas there was no significant difference between incongruent and congruent conditions for schizotypal group. For SP, there were main effects of condition ( $F_{2,54}=16.62, p<.0001$ ) and channel ( $F_{7,189}=5.09, p<.01$ ).

**Conclusions:** Cortical source of N400 is known as anterior cingulate cortex (ACC), and function of ACC is detection of cognitive conflict. Therefore, present results indicate that nonclinical individuals with schizotypal traits have decreased ability of cognitive conflict detection. Correspondence: *Myung-Sun Kim, Ph.D., Psychology, Sungshin Women's University, Dongsun 3 Sungbuk, Seoul 136-742, Republic of Korea. E-mail: kimms@sungshin.ac.kr*

**M. MATSUI, A. TAKEUCHI, Y. MATSUDA, M. SUZUKI, M. KATAGIRI & H. MUROHASHI. Deficit in shifts of attention to different levels of global-local stimuli in patients with schizophrenia.**

**Objective:** Aberrant attention and visual perception have long been considered core deficits of schizophrenia. The purpose of this study was to investigate the persistence of global advantage effect and global/local level repetition and switching effects in schizophrenia using the global-local paradigm.

**Participants and Methods:** Participants were twenty patients with schizophrenia and 20 age- and gender-matched healthy controls. They were administered the global-local tasks including repetitions and switching of global/local level. There were six patterns of repeated-level trials: the repetition in target level was the global-level and the local-level, and the number of repetitions in same target level was two, four, and five, respectively. These trials between repeated-level trials defined as a switching trial.

**Results:** Healthy controls showed reaction time of global level was consistently shorter than that of local level in any repeated-level trials, while patients did not show such a pattern. In addition, healthy controls showed reaction time of the local-to-global level switch was shorter than that of the global-to-local levels switch. On the other hand, there was no difference between both switches in patients. Furthermore, healthy controls showed higher switching cost from global to local levels than the opposite switching cost. However, patients showed higher switching cost from local to global levels than the opposite switching cost.

**Conclusions:** This study using level-repetition procedure demonstrated that schizophrenic patients were difficult for voluntary switching of attention from local target to global target compared with healthy controls. The attention processing bias was directly shown by switching cost, healthy control showed higher switching cost from global to local levels, while patients showed the reverse. These findings suggest an impaired ability to shift the visual attention from local to global processing in schizophrenia.

Correspondence: *Mie Matsui, Ph.D., University of Toyama, 2630 Sugitani, Toyama 930-0194, Japan. E-mail: mmatsui@las.u-toyama.ac.jp*

**TBI (Adult)**

**N. BERG, L. TOGHER, S. BALANDIN & R. STANCLIFFE. Better The Devil You Know: Challenges To Moving Younger People With ABI Out Of Nursing Homes.**

**Objective:** Younger people (YP) living in nursing homes are likely to become increasingly dependent, socially isolated and experience poor health outcomes. Yet, in the absence of alternative care options that provide high-level care, an increasing number of YP with ABI and complex care needs are residing in Australian nursing homes. Furthermore, an unknown number of YP with ABI are at risk of entering nursing homes in the future, particularly when the capacities of their older carers diminish. Despite initiatives to reduce the number of YP living in Australian nursing homes, little is known about the experiences or residential preferences of these YP or their caregivers.

**Participants and Methods:** The lived experiences of two YP with ABI and 10 caregivers were explored as part of a larger grounded theory study investigating the perceptions of nursing home care for YP with a disability. A grounded theory analysis of data collected from in-depth interviews, generated a theoretical explanation of the phenomenon YP living in nursing homes.

**Results:** There is inequitable access to knowledge, services and resources required to prevent YP with ABI from entering a nursing home and support those attempting to return to the community. Furthermore, a perceived brevity of information about current policies to move YP out of nursing homes and the relatively recent inception of unproven alternative care models, fostered a reluctance amongst these participants to consider anything but nursing home care.

**Conclusions:** The provision of purpose built facilities is but one solution to the problem of YP with ABI living in nursing homes. This paper will present the policy and clinical implications of the emergent theory relevant to (a) the successful transition of YP with ABI into community based living and (b) the prevention of YP with ABI entering nursing homes in the first instance.

Correspondence: *Natalie Berg, B.App.Sc (Speech Path), The University of Sydney, 8 Stockwood St, South Penrith, NSW 2750, Australia. E-mail: nber5765@uni.sydney.edu.au*

**M. DRUMMOND. Anosmia after Traumatic Brain Injury: Preliminary Findings of a Prospective Outcome Study.**

**Objective:** Although exact figures are difficult to ascertain, research to date indicates that as many as 50-60% of patients with traumatic brain injury (TBI) admitted to rehabilitation facilities may have olfactory

impairments. Despite high estimates of the incidence of posttraumatic anosmia, there is surprisingly little research investigating its effect on the daily functioning of adults with TBI. This study was designed to investigate the incidence, natural history and functional implications of posttraumatic anosmia in a consecutive series of 100 admissions to a brain injury rehabilitation unit.

**Participants and Methods:** Participants were assessed following resolution of posttraumatic amnesia. Exclusion criteria included a history of nasal surgery, olfactory disturbance and psychiatric disorder. All participants were required to be over 18 years and have sufficient communication skills to support the assessment process. Chemosensory function was measured using the Pocket Smell Test (PST) and the University of Pennsylvania Smell Identification Test (UPSIT). All participants were assessed using the COWAT, WAIS-IV and STROOP. At 6 months participants with olfactory impairment were followed up. The Disability Rating Scale, the Questionnaire of Olfactory Dysfunction – Modified, the Participation Objective, Participation Subjective Scale and the PST and UPSIT were completed. A qualitative interview was also conducted.

**Results:** Preliminary results indicate that of the participants who have completed phase 1 of the study ( $n=22$ ), 77% were identified as having an olfactory impairment. These participants will complete 6 month follow up by May 2011 and follow up results will also be presented.

**Conclusions:** A substantial proportion of adults admitted for rehabilitation following TBI have olfactory impairment. Accurate assessment and appropriate management of posttraumatic anosmia must be incorporated into rehabilitation programs in order to meet the needs of these patients and their families.

Correspondence: *Melanie Drummond, Bachelor of Speech Pathology (Honours), Speech Pathology, Epworth HealthCare, S9 Brigade Road, Richmond, Melbourne, VIC 3088, Australia. E-mail: melanie.drummond@epworth.org.au*

#### **L.M. HASSETT, C.K. SIMPSON, R.E. COTTER, D.L. WHITING, A. HODGKINSON & D. MARTIN. The Implementation of an Electronic Goals System and Staff Training can Increase the Quality of Goal Setting in a Community-Based Rehabilitation Setting.**

**Objective:** To investigate whether the implementation of an Electronic Goals System (EGS) and staff training improved quality of goals set by staff for community clients with severe traumatic brain injury.

**Participants and Methods:** Study design: Non-controlled pre- post-experimental design. Goal quality was rated according to SMART goal criteria. Methods: The Liverpool Brain Injury Rehabilitation Unit evaluated the integration of an EGS within its' existing electronic database. Staff training in goal setting was provided 6-months after implementing this system. Goals were retrospectively audited for 3 time periods; 12-months prior to the EGS going live (T1); 6-months between EGS implementation and staff training (T2); and 6-months following staff training (T3). A random sample of goals were selected from T1 to ensure a similar number of goals were included for the three time-periods. All goals included in the study were de-identified for client and time-period, and randomly ordered. Two pairs of raters rated half the goals each according to the SMART criteria of "Specific" and "Measurable". Both pairs rated the final 100 goals to assess inter-rater reliability.

**Results:** The final sample included 745 goals (T1 = 242; T2 = 283; T3 = 220). Moderate agreement was found between paired raters for both the Specific and Measurable criteria (kappa statistic= 0.471 and 0.600;  $p \leq 0.01$  respectively). There was a significant improvement in goal quality from T1 to T3 according to both criteria (Specific: 79% vs. 89%  $\chi^2=7.5$   $p < 0.05$ ; Measurable: 23% vs. 38%  $\chi^2=13.8$   $p \leq 0.01$ ).

**Conclusions:** Quality of goals can be improved with system changes and staff training.

Correspondence: *Leanne M. Hasset, BApp/Sc(Phy); MHS(NeuroPhy); PhD, Liverpool Brain Injury Rehabilitation Unit, South Western Sydney Local Health Network, Elizabeth Dr, Liverpool, Sydney; NSW 2170, Australia. E-mail: leanne.hasset@sswhs.nsw.gov.au*

#### **H. HO, C. YANG & Y. WU. Goal Characteristics and Adjustment of One Patient with Complicated Mild Traumatic Brain Injury: A Preliminary Case Study.**

**Objective:** Coping with life changes and integrating the brain injury experience into the self are challenges that patients with mild traumatic brain injury (MTBI) face in the process of adjustment. Considering the

goals that patients set in their stress coping process will direct their coping behaviours, determine the result of meaning-making, and eventually influence the integration of the self, investigating the post injury goal-setting of patients with MTBI can not only trace the status of patients' adjustment but also figure out the difficulties underlying their poor adjustment.

**Participants and Methods:** The case study method was used. One 60-year-old female patient with complicated MTBI participated in an in-depth semi-structured interview to describe her experience following TBI. The transcripts were processed with the content analysis method. Characteristics of goal setting and status of adjustment presented in the case's post-injury life were described and analyzed in detail.

**Results:** Results revealed that decreasing focusing on physical symptoms, setting more approaching goals, and setting more future-oriented goals, might benefit the patient's psychosocial adjustment post injury.

**Conclusions:** The study demonstrated the significance and convenience of the goal construct in evaluating adjustment following MTBI. Further qualitative and quantitative studies of application are called for.

Correspondence: *Hsueh-Lin Ho, National Taiwan University, SR115, Department of Psychology, No 1, Sec. 4., Roosevelt Road, Taipei 10617, Taiwan. E-mail: d97227201@ntu.edu.tw*

#### **J.L. MATHIAS. Contribution of Biological and Cognitive Reserve to Outcome after Traumatic Brain Injury: A Meta-analytic Study.**

**Objective:** Traumatic brain injuries (TBI) cause a range of long-term problems. Outcome after TBI is related to the severity of an injury and the amount of brain damage that is sustained but this relationship is far from perfect. While it is recognised that pre-morbid differences in reserve may affect outcome, the extent to which reserve contributes to the variability in outcome after TBI is not well understood. Brain reserve refers to the biological resources that an individual is endowed with and is assessed using a variety of measures, including intracranial volume and specific genetic markers. Cognitive reserve refers to the efficiency of the cognitive networks/processes available to an individual and is assessed using proxy measures, such as educational attainment and estimated pre-morbid IQ. The current study involved a meta-analysis of existing research that has examined the relationship between measures of brain and/or cognitive reserve and outcome following adult TBI.

**Participants and Methods:** A comprehensive search of the PubMed and PsychInfo research data-bases between 1975 and 2010 was undertaken using 49 search terms and their derivatives. All studies were screened using detailed inclusion/exclusion criteria, with 95 studies being eligible for inclusion.

**Results:** Correlations and Cohen's d effect sizes were calculated to assess the extent to which the measures of biological (intracranial volume, APOE status, gender, age) and cognitive (premorbid IQ, education) reserve contributed to outcome (cognitive, vocational, and general/overall). Fail-safe N statistics were additionally calculated to address the bias caused by the tendency for journals to publish significant findings.

**Conclusions:** The findings are discussed in terms of the pre-morbid variables that increase the risk of a poor outcome after TBI and the extent of their contribution to outcome.

Correspondence: *Jane L. Mathias, PhD, Psychology, Univ Adelaide, North Terrace, Adelaide, SA 5005, Australia. E-mail: jane.mathias@adelaide.edu.au*

#### **L. FOSTER, J. MCCLURE & J. MCDOWALL. Brain Injury Through the Mind's Eye: Causal Attributions about Persons with Brain Injury.**

**Objective:** Two studies examined how people's causal attributions for undesirable behaviours of a male adolescent with brain injury reflect three factors: visible markers of brain injury, verbal description of the injury, and familiarity with brain injury.

**Participants and Methods:** In Study 1 ( $N = 98$ ), participants viewed a photo (showing an adolescent with or without a head scar) and a vignette that either stated or did not state that the adolescent had suffered a brain injury. Study 2 ( $N = 148$ ) used a similar design and assessed participants' familiarity with brain injury. The studies examined attributions for the injured person's four undesirable behaviours (e.g., angers quickly) to the brain injury or adolescence.

**Results:** When not informed about the brain injury, participants attributed the behaviours more to adolescence than brain injury in both scar conditions, whereas when informed about the injury, participants

attributed the behaviours more to adolescence than brain injury in the no scar condition but rated both causes equally in the scar condition. Participants who were more familiar with brain injury attributed the behaviours more to brain injury than those who were not. The results show that the visibility of a brain injury, the information people have about the injury and familiarity of brain injury all influenced people's attributions about persons with brain injury.

**Conclusions:** The implications of this pattern are significant. When an adolescent has no visible markers of injury, the public, friends and employers may attribute behaviours resulting from the brain injury to other causes, resulting in less willingness to provide appropriate treatment.

Correspondence: *John McClure, DPhil, Psychology, Victoria University, Victoria University, P.O. Box 600, Wellington 6000, New Zealand. E-mail: john.mcclure@vuw.ac.nz*

#### **A. MIDORIKAWA & M. KAWAMURA. Emergence of artistic ability after traumatic brain injury.**

**Objective:** Some patients have been shown to develop painting abilities after the onset of the disease; however, the reported cases have all been patients with frontotemporal lobar degeneration (FTLD). In this study, we report a patient with a traumatic brain injury who developed an artistic ability after the injury.

**Participants and Methods:** The subject was 49 years-old male, former track driver. He had a traumatic brain injury five years before when he was 44 years-old, due to an accidental fall. MR images showed cerebral contusion in the left frontal and temporal region. Neuropsychological evaluations showed that he had severe verbal deficits and well preserved visuo-spatial ability. His verbal disturbance was characterized as loss of word meaning. He had no habit of painting before the accident and also after the accident for four years. When he was 48 years old, he began to go to day-care and started painting activity.

**Results:** Since then, he has enjoyed painting not only in the day center but also in his daily living. At first, his activity was restricted to reproduction of his photograph and his painting style was realistic and representational. However, his painting style had changed completely for six months. In these days, he painted abstract figures which spring from some inspiration and also he was driven by impulse.

**Conclusions:** Not only chronic degenerative disease, but also more acute brain injury may produce artistic creativity. However, both type of the disease, verbal deteriorations might be necessary to promote their drawing impulse.

Correspondence: *Akira Midorikawa, Ph.D., Psychology, Chuo University, 742-1, Higashi-nakano, Hachioji 192-0393, Japan. E-mail: green@tamacc.chuo-u.ac.jp*

#### **M. PREECE, G.M. GEFFEN & M.S. HORSWILL. Emergency Department Patients' Return-To-Driving Expectations Following Mild Traumatic Brain Injury.**

**Objective:** Individuals with a recent mild traumatic brain injury (MTBI) may pose a risk to road safety while their recovery is incomplete. Knowledge of their return-to-driving (RTD) intentions could establish whether there is a need to educate drivers who have recently sustained MTBI. We surveyed emergency department patients with MTBI regarding their RTD expectations and investigated whether personal or acute injury characteristics influenced RTD expectations.

**Participants and Methods:** Sixty-nine patients with MTBI were recruited from a hospital's emergency department within 24 hours post-injury. Participants completed an 11-item questionnaire measuring expectations regarding recovery from injury; five of the items addressed respondents' opinions regarding RTD.

**Results:** Fifty-one percent of the sample intended to reduce their driving following their injury. Participants intended to reduce their driving for  $M = 6.15$  days ( $SD = 18.82$ ). A logistic regression revealed that only pain could explain a significant portion of the variance in intentions to reduce driving. Similarly, a multiple regression revealed that only pain could explain a significant portion of the variance in estimates of how many days driving was expected to be reduced for. Participants who nominated higher levels of pain at the time of testing were more likely to intend to reduce their driving exposure post-injury.

**Conclusions:** These findings offer cause for concern regarding the road safety of individuals recovering from MTBI. Only half of those surveyed intended to reduce their driving at all post-injury. If such attitudes are widely held, patients with MTBI may benefit from a brief educational intervention regarding RTD upon discharge from the emergency department.

Correspondence: *Megan H. W. Preece, School of Psychology, The University of Queensland, School of Psychology, The University of Queensland, St Lucia, Brisbane, QLD 4122, Australia. E-mail: m.preece@psy.uq.edu.au*

#### **C. PRITCHETT, C. SKILBECK & M. SUMMERS. Executive Function Impairment Following Traumatic Brain Injury: Do Female Sex Hormones Offer Protection?**

**Objective:** Research indicates that sex differences may moderate cognitive impairment following traumatic brain injury (TBI), however results remain inconclusive. The aim of the present study is twofold; to investigate whether there are significant differences between male and female performance on executive function (EF) tasks following TBI, and whether such differences may be explained by variation in female hormone levels. It was predicted that females would perform significantly better than males on EF tasks, but that female advantage would be reduced in post menopausal females.

**Participants and Methods:** A longitudinal design was used, with 189 participants ( $m = 123$ ,  $f = 66$ ) completing the Controlled Oral Word Association Task (COWAT) and Trail Making Task B (TMTB) at 0, 3, 6, and 12 months following injury. Participants were grouped according to sex and age (15-50 and 51-75) with separate repeated measures ANOVAs performed for each age group, co-varying information processing speed.

**Results:** In the 15-50 age group females performed significantly better than males on both the COWAT ( $F(1) = 8.150$ ,  $p = .005$ ) and the TMTB ( $F(1) = 7.717$ ,  $p = .006$ ); there were no significant differences between sexes in the 51-75 group. Subsequent ANOVAs found significant sex differences at each time point, except at 12 months for the TMTB, in the 15-50 group.

**Conclusions:** The results supported the hypothesis that female advantage was only present in females estimated to be pre-menopausal, suggesting higher levels of female hormones may have a protective effect following TBI.

Correspondence: *Christine Pritchett, Bachelor of Psychology, School of Psychology, University of Tasmania, Private Bag 3502, Burnie, TAS 7320, Australia. E-mail: Christine.Pritchett@utas.edu.au*

#### **J.E. REZNIK. Improved walking and reduced pain due to recurrent gross heterotopic ossification (HO), following treatment by extracorporeal shock wave therapy.**

**Objective:** This case report describes the effect of extracorporeal shock wave therapy on a patient with chronic traumatic brain injury (TBI) with recurring HO around the right hip. This novel approach to the treatment of HO has not been previously reported.

**Participants and Methods:** The patient was a 43 year old female who had sustained a severe TBI 10 years earlier and who had undergone surgical excision of HO from the right hip joint eight years previously. The recurrence of HO was causing pain and interfering with her walking ability.

Four applications of extracorporeal shock wave therapy using a Minispec™ Extracorporeal Shock Wave Lithotripsy machine (Medispec Int. USA) were given to the patient over a six week period. Three thousand shock waves were delivered on each treatment at the level 5-6.

**Results:** Prior to the extracorporeal shock wave therapy the patient was unwilling to walk distances of more than ten metres due to pain in her right hip. Because of a reduction in hip flexion she was unable to clear the right foot during swing phase of the gait cycle. Pain was 9 out of 10 on the Visual Analogue Scale (VAS). This pain and its subsequent effect on the patient's behaviour may also have been partly responsible for the patient's reluctance to walk long distances. Following the second treatment pain was reduced to 0 on the VAS scale and apart from one measurement when pain increased again to 2 it remained at 0. There was increased range of motion in all planes at the hip joint and an increase in step length. At a five month follow-up, without further intervention, these results were maintained.



**Conclusions:** Extracorporeal shock wave therapy is a novel, non-invasive treatment for NHO. In the reported case it was effective in reducing pain, and increasing range of motion, which in turn led to greater step length. There was also a positive outcome on the patient's behaviour. Without any further interventions, the effect lasted for at least five months.

Correspondence: *Jackie E. Reznik, B App Sci (Physiotherapy), Physiotherapy, James Cook University, Angus Drive, Townsville, QLD 4811, Australia. E-mail: jackie.reznik@jcu.edu.au*

**S.A. SAINSBURY & K. LEE. Art Therapy in Cases of Acquired Brain Injury: Helping Participants Find Social Context Through Creative Self-Expression.**

**Objective:** "Some key contributions that art therapy can make to rehabilitation include: sensory experiences, symbolic expression, emotional expression, life enhancement, cognitive development and social connectedness" (Van Lith et al., 2010, p.1).

Art Therapy may be useful in cases of Acquired Brain Injury (ABI) where clients may be experiencing a profound and sudden sense of isolation from their premorbid social context, and have lost their sense of connectedness to their previous social world and inherent opportunities for meaningful social interactions.

It is hypothesized that the sensitively facilitated tactile exploration of colour, form, and texture on paper, canvas or through clay can enable the person with ABI to work through feelings of loneliness and loss, and experience psychological healing through symbolic communication in a supportive, social environment.

The aim of this study was to provide individuals with ABI opportunities for strengthening social communication skills, and for these individuals to problem-solve ways to increase the incidence of meaningful interactions with family and friends, and to reflect upon the types of friendships they aspired to forge in the future.

**Participants and Methods:** Six adult residents with ABI from a slow-stream rehabilitation facility took part in a weekly Art Therapy program facilitated by a Speech Pathologist and Art Therapist, and a Social Worker. Each session was 120 minutes in duration, and the program lasted for six weeks.

**Results:** Qualitative data in the form of participant surveys, anecdotal evidence and quality-of-life measures were collected pre, during, and post the program.

**Conclusions:** It was found that exploration of the theme of "socialising" prompted residents, with support from therapists, to actively seek appropriate social contacts outside the therapy group.

References:

Van Lith, T., Fenner, P., & Schofield, M. (2010). Art Therapy in Rehabilitation. In J.H. Stone & M. Blouin (Eds.) *International Journal of Rehabilitation*.

Correspondence: *Sally A. Sainsbury, BSc (Speech and Hearing Science), DipTAT, Brightwater Care Group, 170 Swansea St East, Victoria Park, WA 6101, Australia. E-mail: sally.sainsbury@brightwatergroup.com*

**C. STIRLING, A. DUFF & B. KOOYMANS. Gen Y: Traditional Rehabilitation Vs New Technologies – The Use of iPad as a Therapy Tool.**

**Objective:** This study compared the use of traditional methods (ie. paper diary) and new technologies (ie. iPad) in severely brain injured clients, specifically as an external memory aide and extension to cognitive rehabilitation.

**Participants and Methods:** Case study design using two male participants with extremely severe traumatic brain injury following motor vehicle accidents. Participant one: 20-year old male, 2½ years post-injury with moderate executive impairments and severe physical deficits. Participant two: 18-year old male, 1½ years post-injury with extremely severe cognitive dysfunction and severe physical deficits. Both participants undertake three one-hour occupational therapy sessions per week with minimum 3 hours of structured iPad use. Outcomes were measured at baseline and 12 weeks using the Goal Attainment Scale (GAS), task analysis, and analysis of the scores within each individual cognitive "app".

**Results:** Improved independence and compliance for use of the iPad as a memory tool (ie. diary) was noted in Participant one only. Partici-

pant two's limitation to use the iPad as a memory tool was related to upper limb and visual impairment. Improved motivation and compliance for cognitive rehabilitation was noted in both participants when using the iPad rather than traditional methods. Improvements were also noted within the cognitive "app" scores.

**Conclusions:** The results supported the use of the iPad as a new generationally-appropriate rehabilitation tool for clients with severe traumatic brain injury. Further research is required to determine the efficacy of the use of the iPad in the mild to moderate brain injured population and other generations.

Correspondence: *Catherine Stirling, Bachelor of Occupational Therapy (Hons), Occupational Therapy, Rehabilitation Acquired Brain Injury Services, PO Box 3130, Tarragindi, QLD 4121, Australia. E-mail: catherine@rehabilityabiservices.com.au*

**A. THEADOM, J. SHERRY, S. NASH & A. FOSTER. Effect of the Presence of Blood Alcohol at the Time of Injury on Health Outcomes Post-TBI.**

**Objective:** Understanding the influence of alcohol on recovery is important to inform the treatment of patients post-TBI. Research has revealed that people with alcohol present in their blood at the time of brain injury are more likely to experience medical complications and poorer neuropsychological outcomes, however, the effect on daily functioning remains unclear.

**Participants and Methods:** Routinely collected data on 260 patients (aged >16 years) attending a TBI service over 32 months were analysed. Comparisons between people testing positive and negative for the presence of blood alcohol (tested on admission to hospital), were made using the Glasgow Coma Scale, the Functional Independence Measure and Functional Assessment Measure (FIM+FAM) at 1 and 3 months post-TBI.

**Results:** Preliminary descriptive analysis has revealed that patients with positive blood alcohol at the time of injury were significantly younger in age ( $U = 4252.00, P=0.00$ ) and experienced lower scores on the Glasgow Coma Scale ( $U = 5455.50, p=0.04$ ). However, significantly shorter hospital stays ( $U=5300.50, p=0.03$ ), improved motor skills ( $U=2986.50, p=0.05$ ) and overall functioning ( $U=2975.00, p=0.04$ ) were observed on the FIM at 1 and 3 months for those with presence of alcohol in the blood at the time of injury. Improvements on the self care ( $U=1432.50, p=0.05$ ) and mobility ( $U=1009.00, p=0.00$ ) subscales of the FAM were also observed at 3 months.

**Conclusions:** Patients with a presence of alcohol at the time of injury are classified with a greater severity of injury. The presence of alcohol in the blood at the time of injury appears to have a neuroprotective effect on daily functioning.

Correspondence: *Alice Theadom, BSc, MSc (Hons), National Institute for Stroke and Applied Neurosciences, AUT University, AA254C, AUT North Shore Campus, 90 Akoranga Drive, Auckland 1142, New Zealand. E-mail: alice.theadom@aut.ac.nz*

**G.A. TROUP, M. THOMAS, G.A. TYSON, M. KIERNAN, C.E. SKILBECK & M. SLATYER. The factor structure of the Quality of Life Inventory in a representative sample of adults with traumatic brain injury.**

**Objective:** A number of studies have used Frisch's (2004) Quality of Life Inventory (QOLI) to investigate subjective quality of life outcomes in different clinical populations. Separate research projects have suggested a 1, 2 or 3-factor structure for this measure. Whilst Thomas et al. (2009) confirmed a three factor model using traumatic brain injury (TBI) patients' pre-injury estimates, no research has investigated the structure with a sample of adults reporting subjective quality of life following TBI. The current study compared the three identified factor structures of the QOLI in a population of adults, one month following TBI using confirmatory factor analysis (CFA).

**Participants and Methods:** Responses from 205 participants were obtained from the Neurotrauma Register of Tasmania database. Fit indices of the proposed 1-, 2- and 3-factor models were compared using CFA, and classical test theory measures investigated.

**Results:** The results showed stronger support for the 3-factor structure described by Thomas et al. (2009), compared to the 2 and 1-factor models. However, the inter-correlations between the three factors were very high ( $r > .80$ ). The high inter-correlations between factors raises the question of whether the three factors are essentially measuring the same construct or whether this is reflecting a response bias

**Conclusions:** This study indicated best fit was achieved for the 3-factor model. However, further research will address the question of the possible role of response bias close to the time of injury. This research may have important implications for the clinical utility of the scale.

Correspondence: *Matt Thomas, PhD, Psychology, Charles Sturt University, Panorama Avenue, Bathurst, NSW 2795, Australia. E-mail: mathomas@csu.edu.au*

**C. YANG, S. HUANG, W. LIN, Y. TSAI & M. HUA. Evaluating irritability for patients with traumatic brain injury: A development of the National Taiwan University Irritability Scale.**

**Objective:** Irritability has always been one of the commonest emotional disturbances after traumatic brain injury (TBI). Unfortunately, no specific instruments were designed to measure this psychological construct. The present study thus aimed to develop a specific scale to evaluate the irritability for patients with TBI.

**Participants and Methods:** A total of one hundred and twenty-one participants, which included 81 healthy subjects and 40 patients suffered from TBI, were recruited. Irritability was assessed by the National Taiwan University Irritability Scale (NTUIS), and the Aggression Questionnaire (AQ) and the Beck Depression Inventory-2nd edition (BDI-II) were used to examine the validity of the NTUIS.

**Results:** Our results showed that the NTUIS has good reliability and validity. Moreover, the factor analysis further divided the psychological construct of the NTUIS into 3 different domains: annoyance, anger and verbal aggression. The results also revealed that family-reported irritability post-injury was significantly higher than the irritability reported by the healthy subjects.

**Conclusions:** Accordingly, this study not only demonstrated a fair clinical feasibility of the NTUIS, which might be the first scale to sophisticatedly evaluate the irritability after TBI, but also found that patients with TBI were difficult to be aware of the irritability after head injuries. Hence, it is merited to pay more attention to the reports from significant caregivers when evaluating TBI patients' irritability in clinical settings.

Correspondence: *CHI CHENG YANG, Master of Behavioral Sciences, Dep. of Occupational Therapy, Chang-Gung University, 4F., No.9-1, Alley 30, Lane 14, Sec. 7, Zhongshan N. Rd., Shilin District, Taipei 111, Taiwan. E-mail: d92227007@ntu.edu.tw*

**Y. YEE, S. APPLETON, A. BROWNE, N. CICONI, K. FONG, G. HANKEY, M. LUND & A. MILES. Evaluation of an Early Multidisciplinary Group Intervention to Improve Psychosocial Outcomes following Acquired Brain Injury: A Case Study.**

**Objective:** Difficulties relating to social interaction are common among individuals with Acquired Brain Injury (ABI) and can have a significant impact on rehabilitation outcomes. Communication breakdown due to conversational, pragmatic or social difficulties can adversely affect relationships, employment prospects, and reintegration into the wider community. People who suffer Traumatic Brain Injuries (TBI) or other injuries affecting executive functioning, may lack self-awareness or monitoring skills which would enable them to resume previous occupational and social roles. TBI patients are also at increased risk of experiencing depression, anxiety and the probability of requiring long term health care. A pilot study aimed at evaluating an early multidisciplinary ABI psychosocial skills intervention on patient outcomes was conducted at the Rehabilitation Unit at Royal Perth Hospital.

**Participants and Methods:** Seven patients participated in a 4-week group program co-facilitated by a Speech Pathologist and Clinical Psychologist. The program targeted skills required for effective and appropriate communication in various settings, and skills to manage anxiety. Assessment of communication, psychological functioning and quality of life was completed pre-intervention, immediately post- and 3-months post-intervention.

**Results:** A clinical case study of a group participant will be the focus of this presentation. The individual demonstrated positive psychosocial outcomes following comparison of pre- and post-intervention data. Results will show changes in assessment measures, as well as the feedback given by the participant at the end of the program and the participant's long-term social reintegration outcomes.

**Conclusions:** While facing challenges when reintegrating into the community, the group program provided positive outcomes for this individual. The challenges faced and the benefits noted will be discussed together with implications for development and evaluation of future programs for patients with similar psychosocial issues.

Correspondence: *Yvette Yee, Speech Pathology, Royal Perth Hospital, 6 Selby Street, Shenton Park, Perth, WA 6008, Australia. E-mail: Yvette.Yee@health.wa.gov.au*

**J. YIM, D. BABBAGE, D. NEUMANN, B. ZUPAN, M. TOMITA & B. WILLER. The Relationship Between Cognitive Functioning and Facial Affect Recognition Difficulties after Traumatic Brain Injury.**

**Objective:** Substantial evidence suggests that cognitive functioning and facial affect recognition are impaired to some degree after moderate and severe traumatic brain injuries (TBI). However, very few studies have been set up to investigate the direct relationship between these two cognitive domains in this clinical group, and those that have are limited by small sample sizes and conventional neuropsychological tests. Thus, the primary aim of this paper is to test potential relationships between cognitive functioning and facial affect recognition and address these limitations.

**Participants and Methods:** The correlation between facial affect recognition and cognitive abilities will be analysed from data of a multi-centre randomized controlled clinical trial that examined the efficacy of two new computerised training programmes to improve emotion recognition in people with TBI. This trial is currently being conducted in three international sites: St Catharines Ontario, North Carolina, and Wellington. 55 adults with moderate to severe TBI have been administered with tasks assessing aspects of emotion recognition and measure of empathy. They have also undergone a comprehensive computerised cognitive battery (Cog State) with tests assessing attention, learning, psychomotor function, executive function, memory, and social emotional cognition. Cog State has been shown to be sensitive in capturing subtle changes in cognitive functioning.

**Results:** Results will be discussed in terms of the underlying cognitive mechanisms that may be contributing to the incapacity to recognise facial affect following TBI.

**Conclusions:** Several interventions designed to remediate facial affect recognition deficits for people with TBI have been documented. The findings from this paper may provide valuable information, both theoretically and in terms of rehabilitation.

Correspondence: *Jackki Yim, DClinPsych, School of Psychology, Massey University at Wellington, 24-43 Mulgrave Street, St Pauls Apartments, Thorndon, Wellington 6001, New Zealand. E-mail: jackki\_yim@hotmail.com*

**L. ZHAVORONKOVA, A. ZHARIKOVA & O. MAKSAKOVA. Dual task performance in patients with traumatic brain injury.**

**Objective:** Dual task is a model of everyday activity and can be a method of brain functions estimation after traumatic brain injury (TBI). Postural control is human basic motor function, that's why use of it in dual task can give information about functional recovery after TBI.

Aim of the study was to compare features of dual task performance in patients with TBI and healthy subjects.

**Participants and Methods:** Fourteen patients (age 29.2±0.21, 1-3 months after TBI) and 28 healthy subjects (age 27.6±0.07) were included in the study. In patients clinical state was estimated with MPAI and FIM scales. Patients were divided in two groups: first with more severe motor and cognitive deficit (n=7, FIM109.5±0.26, MPAI33.8±5.4) and second (n=7, FIM122.2±0.2, MPAI14.5±0.16). Motor component of dual task included postural test and cognitive included calculation. Patients and subjects performed tasks separately and then simultaneously. Posturographic parameters and quality of cognitive task were estimated.

**Results:** Posturographic and cognitive values of all patients were worse comparing to healthy subjects. First group was able to perform separate motor and cognitive tasks, but performed the dual task with low success or was unable to perform it. Second group performed the dual task better and it was accompanied by recovery of posturographic parameters. The success of dual task performance correlated with cognitive score in MPAI scale.

**Conclusions:** Thus, the dual task can be a measure of functional recovery of patients after TBI and a marker of possibilities for everyday adaptation. Supported by RHRF 10-06-00114a

Correspondence: *Ludmila Zharovnkova, PhD, Dr of Sciences, Clinical Neurophysiology, Institute of Higher Nervous Activity and Neurophysiology, Butlerova 5a, Moscow 117485, Russian Federation. E-mail: lzharovnkova@hotmail.com*

### TBI (Child)

**E. BEADLE, J. KENARDY, S. WEGENER, M. SWAIN & T. ATTWOOD.** Can children with an acquired brain injury improve their ability control their anger? Examining the effectiveness of a group cognitive behavioural therapy program with children with an acquired brain injury – a pilot study.

**Objective:** Following paediatric brain injury, anger and aggressive behaviour are commonly reported concerns from parents and caregivers. Such antisocial behaviours are also known to have negative effects on the child's developmental trajectory, often leading to delinquency, academic failure, and conduct problems in their adolescence and adulthood. Consequently, there are large costs associated with untreated anger episodes to the child, the child's caregivers, and to the community at large. Early intervention is vital; yet the topic of anger management interventions for children with such brain injuries is poorly explored, low in efficacy, and lacking in practical solutions for the clinical environment. The aim of this pilot study was to examine whether a cognitive-behavioural group intervention (Attwood, 2004) can successfully treat anger management problems in children with an acquired brain injury.

**Participants and Methods:** The program was highly structured and included six sessions, each of two hours duration. Sessions focused on teaching new skills to encourage the cognitive control of emotions. Seven children, aged 10 to 14, were included in the analysis of the program's outcome. Six of the children included had received a TBI of varying severity, while one child had a hypoxic injury.

**Results:** Overall, on non-parametric tests the children demonstrated a trend towards decreased levels of anger; significance was found on most, but not all measures. This result will be interpreted in the context of other cognitive, psychological, and social factors known to impact on socio-emotional and behavioural outcomes following paediatric acquired brain injury.

**Conclusions:** The intervention shows promise as an effective and efficient therapy to treat anger concerns after paediatric brain injury. Further studies are required with a larger population to determine the intervention's true efficacy.

Correspondence: *Elizabeth Beadle, Student of DPsyClin & ClinNeuro; BSci (hon), Psychology, University of Queensland, McElwain Psychology Building, The University of Queensland, St Lucia, QLD 4109, Australia. E-mail: elizabeth.beadle@uqconnect.edu.au*

**E. CHARLTON, J. KENARDY, J. HENDRIKZ, V. ANDERSON, R. LEBROCQUE & L. MCKINLAY.** The Impact of TBI Severity on Children's Health Related Quality of Life.

**Objective:** Previous research has demonstrated that traumatic brain injury (TBI) can be associated with poor physical and psychological outcomes in children. This study aimed to examine the effect of TBI severity on a range of health related quality of life (HRQOL) domains.

**Participants and Methods:** Parents (N = 191) of children with mild to severe TBI rated their child's physical and psychosocial HRQOL at 2 (reflects pre-injury), 3, 6, 12 and 18 months post-injury.

**Results:** At pre-injury, 3 and 6 months post-injury severe TBI was associated with poorer outcomes in children's physical functioning, emotional/behavioural role fulfilment, and parents' free time. The severe TBI group also reported higher parental emotional distress at both 3 and 6 months post-injury. By 12 and 18 months post-injury, no differences were observed between groups in the above areas. Parents also rated children with severe TBI as having poorer general behaviour at 3 and 12 months post-injury and lower self-esteem at 3, 6, and 12 months post-injury. Furthermore, severe TBI was associated with decreased family activities and family cohesion at 6 months post-injury. Bodily pain and mental health were unrelated to TBI severity throughout the follow-up period. Overall, group differences occurred most frequently at 6 months post-injury and were no longer evident by 18 months post-injury.

**Conclusions:** These findings indicate that severe TBI, compared to mild and moderate TBI, is associated with a short term decrease in children's HRQOL, which appear to resolve by 18 months post-injury.

Correspondence: *Erin Charlton, CONROD, The University of Queensland, Ground Floor, Edith Cavell Building, Brisbane, QLD 4029, Australia. E-mail: e.charlton@uq.edu.au*

**S. EREN, V. ANDERSON, C. CATROPPA & J. KENARDY.** Development of Experimental Measures of PTSD – Pilot of Healthy Children and Case Study Analysis In Children With and Without PTSD After TBI.

**Objective:** The DSM criteria for post-traumatic stress disorder (PTSD) were derived on the basis of clinical observations and have been primarily substantiated in the literature by self-reported diagnostic data. The aim of the current study was to develop experimental measures to supplement traditional clinical descriptions of PTSD. Two behavioural versions of the emotional counting stroop and faces paradigms were piloted in healthy children and then employed in case study analyses in children with and without PTSD post traumatic brain injury (TBI).

**Participants and Methods:** A total of 10 neurologically healthy children participated in the pilot study. In addition, two children with moderate TBI only and two children with dual PTSD and TBI were included in the case study analyses.

**Results:** Healthy children responded significantly faster to the baseline condition when compared to the stimuli. There were no significant differences in error rates on both paradigms. Findings on the emotional counting stroop case studies suggested that the processing of trauma-related information may be requiring greater attentional resources in children with PTSD, not only in those who are displaying severe hyperarousal symptoms on clinical presentation. The stroop interference effect was not observed in the healthy controls or children with TBI only, highlighting the disorder-specific nature of the observed interference effect.

**Conclusions:** Overall, the piloting and development of the emotional counting stroop and faces paradigms, together with the case studies, allowed for the establishment of optimal timing parameters for a pediatric population and marked the first time developmentally appropriate versions of these two paradigms were implemented in children.

Correspondence: *Senem Eren, Critical Care and Neurosciences, Murdoch Children's Research Institute, Department of Psychology, Flemington Road, Melbourne, VIC 3052, Australia. E-mail: senem.eren1@gmail.com*

**K. OLSSON, J. KENARDY, G. ISELIN, R. LEBROCQUE, V. ANDERSON, J. HENDRIKZ & L. MCKINLAY.** Impact of Post-Traumatic Stress and Injury Severity on the Recovery of Children's Health Related Quality of Life Following TBI.

**Objective:** Children's outcomes following a traumatic brain injury (TBI) are frequently related to TBI severity, with poorer outcomes being associated with increased TBI severity. However, the impact of TBI severity on children's health related quality of life (HRQOL) is less consistent. Importantly, post-traumatic stress disorder (PTSD) has been shown to negatively impact on the HRQOL of individuals with extracranial injuries. Recently, PTSD has been shown to occur following TBI and to be associated with poorer health outcomes among adults with TBI. This study aimed to evaluate the impact of TBI severity and PTSD on the recovery of children's HRQOL up to 18-months post-TBI.

**Participants and Methods:** Children (N=205) with mild to severe TBI were assessed at 2, 3, 6, 12, and 18-months post-TBI. Children completed measures of PTSD and parents rated their child's physical and psychosocial HRQOL.

**Results:** Severe TBI was associated with poorer physical HRQOL up until six months post-TBI, with no significant differences in children's physical HRQOL thereafter. In comparison, poorer psychosocial HRQOL scores were associated with more severe TBI and PTSD. There was no evidence of recovery in psychosocial HRQOL over time. There was a trend towards PTSD being associated with poorer physical HRQOL.

**Conclusions:** Severe TBI is associated with a delayed recovery in children's physical and psychosocial HRQOL. PTSD also negatively impact on children's psychosocial HRQOL, highlighting the need for early intervention and treatment of PTSD.

Correspondence: *Katherine Olsson, CONROD, The University of Queensland, Ground Floor, Edith Cavell Building, Brisbane, QLD 4029, Australia. E-mail: katherine.olsson1@gmail.com*

**L. FOSTER, J. LEATHEM & S. HUMPHRIES. Brain Injury and Socialisation: Do Visible Signs of Injury and Familiarity with Brain Injury Influence Peoples Willingness to Socialise?**

**Objective:** This study explored whether visible markers of brain injury, familiarity with brain injury and gender influence peoples willingness to interact with adolescents with brain injury and their family.

**Participants and Methods:** Participants (N = 100) read a brief description about an adolescent with a brain injury accompanied by a photograph of either a male or female adolescent with or without a head scar and completed a short questionnaire.

**Results:** Male participants were more willing to move next door to the adolescent's family, have their adolescent make friends with the adolescent and have that adolescent in their adolescent's classroom when there were visible signs of brain injury, than when there were no visible signs of brain injury. Female participants were not influenced by the scar. Typically those less familiar with brain injury were more willing to have the adolescent in their adolescent's classroom when there were visible signs of brain injury, than when there were no visible signs of brain injury. However, female respondents were less willing when familiar with brain injury and when there were no visible signs of brain injury. Female participants with less familiarity were not influenced by the scar.

**Conclusions:** In certain social settings visible signs of brain injury may prompt people to be more willing to socialise with adolescents with brain injury. These findings contrast with previous stigma research as historically people with visible signs of disability experience more prejudice and discrimination than people without visible signs of disability.

Correspondence: *Lyn Foster, Psychology, Massey University, Private Box 756, Wellington 6140, New Zealand. E-mail: lynfoster2@hotmail.com*

**J. HANCOCK, B. THOMAS, B. WAN & A. MORROW. Balance, Mobility and Community Participation Outcomes in a Cohort of Children with Acquired Brain Injury.**

**Objective:** Clinical practice suggests children who sustain a moderate or severe brain injury often have physical impairments that impact their long term mobility and community participation. However the prevalence and extent of mobility and balance impairments for this children and adolescents following an acquired brain injury have not been quantified. This study evaluates mobility and balance outcomes in this population, and examines its correlations with injury severity and length of hospital stay.

**Participants and Methods:** A retrospective chart review of all admissions (122 patients aged 5-18 years old at time of admission) during 2006-2007 to the Brain Injury Service at The Children's Hospital at Westmead was conducted.

**Results:** Patient demographics were described including gender, diagnosis, injury severity, length of hospital stay and other injuries or premorbid factors that would influence gait and balance. Outcome measures included body mass index, mobility scores, balance scores, school return and recreational activity. Outcomes at discharge and 3, 12 and 24 months post injury were recorded. A substantial proportion of children who sustained a moderate or severe brain injury had ongoing impairments that impacted their mobility and ability to participate in community activities.

**Conclusions:** This study quantifies the prevalence and extent of impaired mobility and balance in our cohort. Factors such as injury severity and length of hospital admission may predict mobility and balance outcomes. These findings may have implications for the prediction of long term mobility and balance impairments as well as community participation.

Correspondence: *Jan Hancock, B Ap Sc (Physiotherapy), Kids Rehab, The Children's Hospital at Westmead, Locked Bag 4001, Westmead, NSW 2145, Australia. E-mail: JanH@chw.edu.au*

**C. KNUEPFER, B.E. MURDOCH, F.M. LEWIS, F.J. HINCHLIFFE & D. LLOYD. Reduced Semantic Priming Effects in two Females 40 years post Paediatric Closed Head Injury - a Preliminary Investigation.**

**Objective:** Given the excellent temporal resolution of ERP recordings and the repeated criticism regarding the limited sensitivity of traditional

language tests to reveal the often subtle language deficits associated with paediatric closed head injury (CHI), it is hypothesised that ERP recordings might aid in identifying semantic processing deviations in former paediatric CHI patients which might not have been readily detected by behavioural tests only.

**Participants and Methods:** ERPs during a picture-word matching task were recorded from two females 40 years post paediatric CHI (Case 1 (C1): 40 years; severe CHI at age 6, hit by a car, PTA duration: 6 weeks; Case 2 (C2): 38 years; mild CHI at age 18 months, fall, no loss of consciousness) and ten control participants. Priming stimuli were pictures followed by a spoken word which was either identical to the picture (condition 1), within the same category (condition 2) or unrelated (condition 3). The N400 was defined as the mean amplitude during an interval of 350-450ms post target stimulus onset for the average waveforms obtained for each of the three conditions. C1 and C2 were additionally assessed with standardised language tests.

**Results:** C1 and C2 scored within the average range on the behavioural tests. One-way ANOVA's using Bonferroni adjustment for repeated measures revealed larger N400 amplitudes in condition 3 than in condition 2 and 1 for each participant. However, this effect was reduced in C1 and C2. Additionally, both Cases did not show semantic modulation (i.e., an intermediate N400 amplitude in condition 2) to the same degree as their peers.

**Conclusions:** The current data provides preliminary support for the hypothesis that ERPs in paediatric CHI survivors can show deviations in language processing that might be too subtle to be revealed by behavioural tests only. Future research implementing similar ERP recordings in larger groups and in recent paediatric CHI cases will be of value for the evaluation of ERPs as a sensitive tool for semantic processing assessment.

Correspondence: *Christina Knuepfer, PhD Candidate, Centre for Neurogenic Communication Disorders Research, The University of Queensland, Therapies Building (S4A), Level 7, St Lucia, Brisbane, QLD 4072, Australia. E-mail: c.knuepfer@uq.edu.au*

**M.A. WAUGH, J. NORONHA, M. NAZAR, E. NGUYEN & P. MURPHY. Transition from Paediatric to Adult Brain Injury Services - A Survey of the Family's Experience.**

**Objective:** During adolescence, youth with acquired brain injuries (ABI) will transition from paediatric to adult health services. Identifying facilitators and barriers to successful transition is essential for developing effective transition programs. Empirical studies of ABI transition programs are lacking. Suitable programs need to accommodate the behavioural, social and cognitive impairments of the youths. The study evaluates a transition program which includes, amongst other strategies, information packages, transition planning commencement at 15-16 years of age, and joint meetings with adult services.

**Participants and Methods:** Case-series design, examining family and client transition experiences before and after implementation of a formalised transition process in the Kids Rehab Dept. Brain Injury Service. The department database identified youths discharged before (Group A -no program), and after (Group B -formalised program) program implementation. Randomly selected participants were telephone interviewed using standardised questionnaires covering areas such as availability and uptake of adult services, parent opinions, and user satisfaction. Forty-two questionnaires (32 family, 10 client) regarding 33 cases (Group A: n=15, Group B: n=18) were collected.

**Results:** Data was qualitative and collated in tables. The program was found to have greater impact on family than on client perceptions. Feedback and improvement suggestions varied between and within groups. In general, Group B reported better transition experiences and greater awareness of adult services than Group A.

**Conclusions:** Families are now better informed, though concerns regarding service availability for ABI youth in the adult sector remain. The study identifies facilitators and barriers to transition from which service providers will benefit. The program has moved some way in improving transition however further research is required.

Correspondence: *Patricia Murphy, Rehabilitation, Childrens Hospital Westmead, Locked Bag 4001, Westmead, NSW 2145, Australia. E-mail: PatricM6@chw.edu.au*

**N.J. STARKEY, V. FEIGIN, S. BARKER-COLLO, A. THEADOM & K. JONES. The Incidence of Paediatric Traumatic Brain Injury in New Zealand: Preliminary Findings.**

**Objective:** Paediatric Traumatic Brain Injury (TBI) is the single most common cause of death and disability in children, and self-reports suggest 31% of children experience a head injury before the age of 18. In NZ, head injury rates during childhood are highest for those under 4 yrs and the 15-19 year age groups, with males being at greater risk than females. However, the true incidence of head injury is likely to be higher as many with mild TBI do not seek medical treatment, or are not admitted to hospital. To provide more accurate data, the Health Research Council funded the BIONIC study (Brain Injury Outcomes in the Community) which aims to determine incidence, case fatality and 6-month outcomes of all TBIs occurring in residents of Hamilton and Waikato Districts over a twelve month period.

**Participants and Methods:** Case ascertainment commenced in March 2010.

**Results:** Preliminary analyses of data from the first ten months reveal that 344 cases of paediatric TBI have been registered (33% of the total). Of these, the majority were identified via the hospital (67%), with a significant proportion referred from their GP (22%) or Accident and Medical Clinics (9%). In keeping with the previous literature, males appear to be at higher risk (68% of cases) compared to females, and over two thirds of injuries occurred in those aged between 1-3 years and 12-15 years. We currently have TBI severity ratings for 317 cases. As expected, most of the injuries (98%) were classed as mild. Of these 34% were low risk, 26% medium risk, and 24% were high risk mild TBI. Only 4 moderate and 2 severe TBIs have been identified.

**Conclusions:** Currently, around 70% of those approached have agreed to participate in the full study. Assessments are conducted at baseline, 1 month and 6 months post injury and include cognitive and behavioural functioning, mood disorders, quality of life, service utilisation and family burden. Study findings will allow us to examine the impact of childhood TBI over the first six months post-injury.

Correspondence: *Nicola J. Starkey, PhD, School of Psychology, Univ of Waikato, Private Bag 3105, Hamilton 3240, New Zealand. E-mail: nstarkey@waikato.ac.nz*

**A. THORNE, S. DUFF & T. BRANDTMAN. Investigating Pretend Play Development in Pre-schoolers with an Acquired Brain Injury.**

**Objective:** Play is crucial to children's cognitive development, encouraging problem solving and mastery of new skills (Wyver and Spence, 1995, Ziviani, Boyle & Rodger, 2001). Play is also the context in which social skills and peer relationships are developed (Leipold & Bundy, 2000, Glover, 1998). Aims 1. Determine if children (4.0-5.11 years of age) who have sustained an acquired brain injury (but perform in the average range on cognitive assessment and do not have a significant physical disability) have a disparity in pretend play skills when compared to normative data. 2. Would Occupational Therapy intervention be effective in developing pretend play ability in this population.

**Participants and Methods:** Sample group: 3 boys and 2 girls, aged 4-6 years.

The Children were assessed using the Child Initiated Pretend Play Assessment (CHIPPA), Peabody Developmental Motor Scales-2 (fine motor subtests) and 2 norm referenced behavioural measures. The Children then attended a 6 week Occupational Therapy 'pretend play' group.

**Results:** Pre scores on the CHIPPA were compared to norms.

Pre and post treatment scores on the Peabody and chippa were compared. 1. The findings of this study indicated children with an acquired brain injury but average cognitive ability have impaired play skills when compared to peers. 2. Targeted Occupational Therapy intervention appeared to result in improved pretend play.

**Conclusions:** 1. The findings of this study indicated children with an acquired brain injury but average cognitive ability have impaired play skills when compared to peers. 2. Targeted Occupational Therapy intervention appeared to result in improved pretend play. 3. The outcome of this study will lead to a new model of service delivery for the pre-school aged clients of our service.

Correspondence: *Adrienne Thorne, BappSc Occupational Therapy, Rehabilitation, The Children's Hospital at Westmead, Locked Bag 4001, Westmead, NSW 2145, Australia. E-mail: adrienn@chw.edu.au*

**National Keynote Address:  
Language, Time, and the Lopsided Brain**

**Speaker: Mike Corballis**

**9:00-10:00 a.m.**

**M. CORBALLIS. Language, time, and the lopsided brain.**

The human mind has characteristics often considered uniquely human. I will consider the likely evolutionary trajectory of three of them: language, mental time travel, and cerebral asymmetry. Although it is widely assumed that language emerged within the last 150,000 years, and only in *Homo sapiens*, I argue instead that it originated in manual gestures, within a neural system also evident in modern-day primates and apes. It was speech, not language itself, that eventually became dominant in our own species. The complexities of symbolization and syntax may have emerged during the Pleistocene from around 2 million years ago, as an adaptation for the representation and communication of events displaced in space and time. This in turn was dependent on the extension of episodic memory to create episodic scenarios for future planning, and for the invention of stories as a form of episodic play. The complexities of these functions drove an increase in brain size, and an enhancement of cerebral asymmetries also present in more muted form in great apes.

Correspondence: *Michael Corballis, PhD, Psychology, University of Auckland, Private Bag 92019, Auckland 1142, New Zealand. E-mail: m.corballis@auckland.ac.nz*

**Session 10:  
Neurology and Psychiatry**

**10:30 a.m.-12:00 p.m.**

**W.J. BREWER, C. DICKSON, J. GLEESON & P. MCGORRY. Olfactory Predictors of Aggression in First-Episode Psychosis: Implications for Orbitofrontal Neural Compromise.**

**Objective:** Dysfunction of the orbitofrontal cortex (OFC) has been implicated in the pathophysiology of first episode psychosis (FEP) and also in disinhibited aggressive behavior. We have used OI tasks to systematically investigate the integrity of the OFC within neurodevelopmental disorders and specifically have demonstrated relationships between the more debilitating aspects of psychosis and OI deficits. The current study aimed to identify a subgroup of FEP clients who are characterised with significant antisocial personality traits and to investigate the relationship between OI deficits and aggression and impulsivity.

**Participants and Methods:** Thirty FEP clients (Mean age: 22.71 [SD: 3.5] years) recruited from an Intensive Case Management Team at Orygen Youth Health. The team was designed to target high risk for aggression. FEP clients were assessed with the University of Pennsylvania Smell Identification Test (UPSIT), the Buss-Perry Aggression Questionnaire (BPAQ) and the Barrett Impulsiveness Scale-II (BIS). Exclusion criteria included a history of head injury and compromised olfactory sensitivity. Confounds were addressed with measures of anxiety, depression and premorbid IQ.

**Results:** Consistent with previous findings, FEP had OI deficits (M: 31.03 [SD: 4.90]) compared to age and gender matched Australian normative data (M: 34.0 [SD: 0.7]). A higher prevalence of reactive (M: 50.20 [SD: 19.42]) compared to proactive aggression (M: 37.30 [SD: 23.25]) was found ( $t(29) = -2.62, p = .014$ ). After accounting for confounds, reactive aggression was a significant predictor of degree of OI deficits ( $\beta = -.54, p = .002, R^2 = 0.26$ ). Impulsivity was not associated with OI deficits.

**Conclusions:** This is the first study to examine the relationship between OI and aggression in a high-risk FEP cohort. Once the integrity of lower order olfactory processing pathways has been established, our findings implicate the role for reduced OFC functioning in reactive aggression in FEP. Clinical implications are discussed.

Correspondence: *Warrick J. Brewer, PhD, Neuropsychology, Orygen Youth Health Research Centre: University of Melbourne, Locked Bag 10, Parkville, VIC 3052, Australia. E-mail: w.brewer@unimelb.edu.au*

**A. OLLEY, P. SACHDEV & G. MALHI. Obsessive Compulsive Disorder: Failure to Inhibit or Failure to Decide?**

**Objective:** Inhibitory failures (IFs) have been proposed as an endophenotype of OCD to account for both clinical and cognitive characteristics of the disorder (Chamberlain et al., 2006; 2009) however IFs fail to account for the chronic doubt and indecision seen clinically, and the totality of neurobiological findings. In order to incorporate all aspects, OCD as a disorder of decision making was proposed (Sachdev and Malhi, 2005). The current study sought to evaluate both response inhibition and decision making models. Accordingly, abnormalities in OCD response inhibition would manifest as increased errors of commission (impulsivity) while suboptimal decision making would be mediated by regret.

**Participants and Methods:** Thirty OCD and 30 Healthy Control (HC) participants, group matched for age, gender, and NART FSIQ, completed clinical scales and two novel tasks: A novel affective Go/No-go task (aGNG) of inhibition, and a decision making Gambling Task (GT; Coricelli et al 2005) that had not previously been used in OCD.

**Results:** aGNG: No evidence of increased impulsivity (commission errors), inattentiveness (omission errors) or reaction time was observed in OCD ( $p > .05$ ). There was a trend only for OCD participants to 'miss' negative OCD-related words, in comparison to HCs ( $p = .08$ ).

GT: OCD trended toward suboptimal responding ( $p = .07$ ), with more conservative winnings due to an avoidance of regret ( $p = .05$ ), slower decision making speed ( $p = .014$ ) and less satisfaction ( $p = .001$ ) than HCs. Cumulative regret over time was able to discriminate between the two groups ( $p = .004$ ).

**Conclusions:** Individuals with OCD are able to inhibit prepotent responses and shift the focus of attention as well as HCs, with only a non-significant trend for an attentional bias toward OCD-relevant stimuli. This suggests that IFs alone are insufficient as an endophenotypic marker of OCD. On the contrary, avoidance of regret and slowed decision making speed (independent of reaction time) provide support for the disrupted decision making model of OCD.

Correspondence: *Amanda Olley, Master of Clinical Neuropsychology, Psychiatry, University of New South Wales, Euroa Centre, Prince of Wales Hospital, Randwick, NSW 2031, Australia. E-mail: amanda.olley@gmail.com*

**S.L. MEIER, L.J. TIPPETT & D.R. ADDIS. Assessment of Orbital Prefrontal Cortex Using fMRI in Amyotrophic Lateral Sclerosis: A Case Study Approach.**

**Objective:** Amyotrophic Lateral Sclerosis (ALS), a progressive disease affecting motor neurons, variably affects cognition and behaviour. Recent findings indicate subtle changes in behaviour, emotional processing, decision-making and social awareness, associated with orbitofrontal cortex (OFC) changes, may be present in 50% of individuals with ALS without dementia. We hypothesized that ALS individuals with behavioural or neuropsychological signs of OFC dysfunction would show different activation patterns compared to controls when performing a probabilistic reversal learning task, while those without behavioural dysfunction would not.

**Participants and Methods:** Using fMRI, we examined OFC activation in 2 case studies with ALS and 15 controls. An event-related design with case study analysis was used to evaluate patterns of activity during reward, punishment and affective-shift trials of the reversal learning task relative to a matched affectively-neutral baseline.

**Results:** Behavioural performance on the reversal task did not differ between ALS and control participants. For Case NA, who had no behavioural evidence of problems with social or emotional functioning, activity did not differ from controls on any contrast. Case NA therefore shows no evidence of any changes to OFC function. Case SB's activity, however, was more bilateral and more spatially extensive than controls for reward, punishment and affective-shift trials. Case SB had mild impairment on neuropsychological tests sensitive to OFC function and behavioural disturbance.

**Conclusions:** These findings suggest compensatory change in OFC function enabled case SB to achieve behavioural equivalence on the reversal-learning task. Compensatory activity, while sufficient for this task, failed to mask all aspects of her behavioural and social change. We predict that with disease progression, Case SB's OFC activation levels and behavioural performance will deteriorate. Together these two cases are consistent with research showing variability in cognitive integrity in ALS.

Correspondence: *Sandra L. Meier, PhD, Psychology, The University of Auckland, Private Bag 92019, Auckland 1142, New Zealand. E-mail: s.meier@auckland.ac.nz*

**P. KLAAS & J.C. MOSHER. Mapping Cortical Responses in Epilepsy Patients Using MEG.**

**Objective:** We examine the use of magnetoencephalography (MEG) as a means of distinguishing the spatial and temporal dynamics of sensory cortical responses, particularly in patients with refractory epilepsy. We build upon the prior research of Frot and Mauguiere (1999) (FM99), who used stereotactic electroencephalography (SEEG) and Talairach stereotactic coordinates to invasively examine somatosensory evoked potentials (SEP). We instead use MEG to non-invasively map responses onto a common cortical surface

**Participants and Methods:** Participants were all individuals with medically refractory epilepsy who were being seen as part of the epilepsy surgery protocol. All had MEG as part of their care at the Cleveland Clinic. As part of the clinical MEG, somatosensory evoked fields (SEFs), using stimulation of the median nerve, are used to further identify specific cortical areas and assist in co-registration with MRI. The Montreal Neurological Institute (MNI) Collin N27 MRI was morphologically warped to fit the patient's scalp. Source imaging using a minimum norm estimate (MNE) was performed on labeled parcels of the MNI tessellated cortex, and the time series examined.

**Results:** The temporal dynamics of homologous parcels within each hemisphere were examined at several locations. The data of 5 patients ranging in age from 10 to 66 with refractory epilepsy indicates that latencies to peak amplitude for the SEFs are within 1 standard deviation of normal controls.

**Conclusions:** The method of extracting and analyzing the data is different from that reported previously (FM99). By using MNE and a parcellated cortical map, these results indicate the MEG is a useful non-invasive tool for determining the spatial and temporal characteristics of cortical response in epilepsy patients.

Correspondence: *Patricia Klaas, PhD, Psychiatry & Psychology, Cleveland Clinic, 9500 Carnegie Ave, P-57, Cleveland, OH 44195. E-mail: KLAASP@ccf.org*

**E. GIOGKARAKI. Three profiles of cognitive dysfunction in different multiple sclerosis subtypes and clinically isolated syndromes.**

**Objective:** To investigate the pattern of cognitive dysfunction in different multiple sclerosis (MS) subtypes and clinically isolated syndromes suggestive of MS (CIS), relative to control participants. We suppose that distinct patterns of cognitive dysfunction might occur, based on impairments on working memory and executive functions.

**Participants and Methods:** 232 patients with MS and CIS, and 60 healthy control participants were assessed by the Brief Repeatable Battery of Neuropsychological Tests (BRBN) and a version of the Stroop Word-Color Interference Test (Stroop).

**Results:** A Principal Component Analysis (PCA) tested the construct validity of our battery of tests and yielded three components for our sample: C1: executive functioning component including processing speed, semantic fluency, selective attention and inhibitory capacity. All the measures included in this component we supposed that imply initiation capacity. C2: working memory component included a task of visuospatial learning and memory and another auditory task which requires different cognitive processes such as mental calculation and inhibition. C3: verbal episodic memory component. The MANCOVA with the regression factor scores from PCA showed significant differences between control participants and MS patients and differences between MS subtypes. We defined cognitive types based on the PCA scores there was the dysexecutive type, the amnesic type, the working memory dysfunction type and combinations of them. The most frequently appearing cognitive type to all clinical subtypes was the working memory dysfunction type.

**Conclusions:** We suggest three distinct profiles of cognitive dysfunction (and combinations of them), which could be useful in order to suggest domain specific cognitive interventions.

Correspondence: *Erasmia Giogkaraki, PhD, Psychology, University of Cyprus, 59, Arch Makariou C Avenue, Nicosia 1070, Cyprus. E-mail: erasmia.yogarak@gmail.com*

**J. NARAYANAN, J. GREENE, R. DUNCAN, S. RAZVI, J. LEACH, J. MCLEAN & J.J. EVANS. Accelerated Long-Term Forgetting in Temporal Lobe Epilepsy: Verbal, Non-Verbal and Autobiographical Memory.**

**Objective:** Patients with temporal lobe epilepsy (TLE) often present with memory complaints despite performing within normal limits on standard memory tests over usual delays (30 minutes). With potentially important social consequences, patients report forgetting autobiographical experiences over a period of days/weeks, despite good recall after a shorter period of hours/days. Knowledge of the specific effects of unilateral TLE on accelerated long-term forgetting (ALF) is limited. The present study investigated material specific ALF in patients with unilateral TLE and also investigated ALF in relation to autobiographical memory (ABM) on a novel standardized anterograde autobiographical event memory task.

**Participants and Methods:** Fourteen patients with TLE and 17 controls were given verbal, nonverbal and anterograde autobiographical event memory tasks. Participants were tested for immediate recall and recognition at 30 min and after 4 weeks. Accelerated forgetting was calculated using the percentage decay of memory from the 30 minute delay trial to the 4 week delay trial.

**Results:** At 30 minute delay there was no significant difference between the patient group and controls on the primary outcome measures apart from on a non-verbal memory task. After 4 weeks, patients were significantly poorer on verbal, non-verbal and autobiographical memory tasks. On the measure of accelerated forgetting, patients with left TLE showed significantly greater ALF of verbal material and a trend towards greater ALF of ABM. Patients with right TLE showed a non-significant trend towards greater ALF of non-verbal material. Patients with hippocampal abnormalities showed greater ALF compared to patients without hippocampal abnormalities. Patients with seizures that generalized had more global memory deficits and greater ALF.

**Conclusions:** Patients with TLE show material specific accelerated long-term forgetting and accelerated forgetting of autobiographical events that is more pronounced with an abnormal hippocampus or seizures that secondarily generalize.

Correspondence: *Jonathan J. Evans, PhD, Mental Health & Wellbeing, University of Glasgow, Academic Unit, Gartnavel Royal Hospital, 1055 Great Western Road, Glasgow G12 0XH, United Kingdom. E-mail: jonathan.evans@glasgow.ac.uk*

**Session 11:  
Methods and Measurements of Brain Injury**

**10:30 a.m.–12:00 p.m.**

**C. EGAN, L. ELLIOTT & D.L. WHITING. Management of Minimally Conscious Traumatic Brain Injured (TBI) Patients: Evaluation of the Western Neuro Sensory Stimulation Profile (WNSSP) as a Clinical Predictor for Rehabilitation Readiness.**

**Objective:** Standard measures used in NSW Health for recovering TBI patients, such as the Functional Independence Measure (FIM), are not sensitive to change in those who are minimally conscious. The project will review the WNSSP (a 33-item clinician-administered test of cognitive function) in minimally conscious brain injured patients against standard measures and determine its clinical usefulness for predicting rehabilitation readiness and commencement of Post traumatic Amnesia (PTA) testing.

**Participants and Methods:** A total of 41 minimally conscious TBI patients were consecutively recruited from BIRU inpatient ward from 2006 to 2011. The WNSSP was administered by allied health staff on a fortnightly basis until two consensus scores of 80 or above were achieved. Additional data collected included PTA scores, FIM scores and demographic information.

**Results:** Participants included 33 males and 8 females with a median age of 32.4 years. The WNSSP demonstrated a significant relationship to the FIM ( $r=.43$ ,  $n=62$ ,  $p=.000$ ) but 88.7% of FIM scores were at the baseline, while the WNSSP scores were more normally distributed. Examination of individual items of the WNSSP revealed that Question 15, requiring a Yes/No response, demonstrated good specificity (100%) and sensitivity (77.1%) for successful commencement of PTA testing with only 22.9% indicating a false positive ( $\chi^2=49.3$ ,  $p=.000$ ).

**Conclusions:** The WNSSP represents a comprehensive measurement of recovery in the minimally conscious and it is more sensitive than the FIM. One item, Question 15, is predictive of successful commencement of PTA testing providing a time efficient and easily administered indicator of rehabilitation readiness.

Correspondence: *Cara Egan, BAppSc, Occupational Therapy; Occupational Therapy; Liverpool Brain Injury Unit, Elizabeth Drive, Liverpool, NSW 2170, Australia. E-mail: cara.egan@sswahs.nsw.gov.au*

**M. PERDICES, R.L. TATE, A. PFAFF, G. HERKES, A. HODGKINSON, P. DAVID & A. CASSELL. A simple regression model for predicting duration of post-traumatic amnesia (PTA).**

**Objective:** A challenge in the post-acute rehabilitation of patients with TBI is being able to anticipate when they will emerge from PTA. Using regression analysis, we have previously developed predictive models to estimate duration of PTA in patients with very severe TBI (PTA>1 month). In a sample of 61 patients, day post-trauma PTA testing commenced and scores on the Modified Oxford PTA Scale for the first five days of testing, accurately predicted duration of PTA, accounting for 88% of the variance (Tate et al 2001). In a subsequent sample ( $n=84$ ) patients, scores for the first three days of testing accurately predicted duration of PTA, accounting for 45% of the variance (Tate et al 2006). The present study investigated the predictive value of the second model in patients with milder TBI.

**Participants and Methods:** Fifty-five patients were tested during PTA (mean PTA duration=10.1 days). Regression analyses were conducted using the summed score for the first three days of PTA testing.

**Results:** A model accounting for 74% of the variance was derived. Correlation between observed and predicted days to emergence from PTA was .86 ( $p<0.0001$ ). The sample was then combined with the original group ( $n=84$ ). Mean duration of PTA in the combined group ( $n=139$ ) was 30.7 days (range 1-88). A model accounting for 54% of the variance was derived. Correlation between observed and predicted days to emergence of PTA was .74 ( $p<0.0001$ ).

**Conclusions:** Duration of PTA in patients with TBI can be reliably predicted across the spectrum of TBI severity.

Correspondence: *Michael Perdices, PhD, Neurology; Royal North Shore Hospital, Pacific Highway, St Leonards, Sydney, NSW 2065, Australia. E-mail: mperdices@nscchs.health.nsw.gov.au*

**R. TATE, G. SIMPSON, C. SOO & A. LANE-BROWN. Measuring Participation after Traumatic Brain Injury: Construct Validity and Clinical Utility of the Sydney Psychosocial Reintegration Scale.**

**Objective:** Participation is an important domain for measuring the level of adaptation attained by people with traumatic brain injury (TBI). Yet, the construct of participation is difficult to operationalise and scales of participation are generally limited because they use Likert-type rating scales with ordinal-level measurement. This study aims to improve the Sydney Psychosocial Reintegration Scale version 2 (SPRS-2), a reliable and valid 12-item instrument with two forms (Form A: "change since injury"; Form B: "current status") that measures occupational, interpersonal and living skills functioning. Construct validity of the SPRS-2 was examined with Rasch analysis and a reliable change index score was generated.

**Participants and Methods:** Participants were convenience samples ( $n=351$ , pooled from seven studies) of people with severe TBI, at least 12 months post-trauma and living in the community. Rasch analyses were conducted on Form A ( $n=201$ ) and Form B ( $n=150$ ).

**Results:** Both Form A and Form B were a good fit to the Rasch model, for both person (3.36 and 3.03 respectively) and item (7.78 and 7.25 respectively) separation and reliability coefficients were high (all >0.90). Average infit statistics met standard criteria. The reliable change index value was calculated using logit scores.

**Conclusions:** The SPRS-2 demonstrates strong psychometric qualities as a measure of participation after TBI. In particular, logit scores derived from Rasch analyses are valuable in that they provide interval-level data, and the availability of a reliable change index score means that the clinician can readily ascertain whether significant change has occurred in individual patients. Correspondence: *Robyn Tate, PhD, Rehabilitation Studies Unit, c/- Royal Rehabilitation Centre Sydney; PO Box 6, Ryde, NSW 1680, Australia. E-mail: rtate@med.usyd.edu.au*

**A. JANSARI. JAAM©: A Novel Ecologically-Valid Virtual Reality Assessment of Executive Functions.**

**Objective:** Executive functions can be compromised in a variety of ways including brain damage, drugs, alcohol and ageing. Traditional clinical measures have proven poor at providing accurate assessments and can lack ecological validity (Norris & Tate, 2000; Wood & Rutherford, 2004). Using Virtual Reality (VR) a new assessment known as JAAM© addresses these issues through a series of experiments on a variety of populations.

**Participants and Methods:** JAAM© is a role-playing task carried out in a virtual environment which mimics aspects of the Multiple Errands Task (MET) but in a safe manner using a standard laptop. Performance is evaluated on eight constructs central to executive function (e.g. planning, selection and prospective-memory). A series of separate studies investigated the impact of brain damage, schizophrenia, Androgen-Deprivation Therapy for prostate cancer, recreational ecstasy and long-term alcohol abuse on executive functions. The target population and matched controls were compared on JAAM© as well as traditional measures including the WCST, FAS and Zoo Map from the BADS.

**Results:** Each study found a significant difference between the target population and matched controls on overall JAAM© as well as performance on individual executive constructs; the traditional tests, however, failed in each study to discriminate the groups. Additionally, the profile of performance across the cognitive constructs was found useful for directing vocational rehabilitation in patients with brain damage.

**Conclusions:** JAAM© is a safe ecologically-valid task that shows great potential for becoming a standard assessment of higher level executive functions. Due to performance being evaluated across eight constructs, it also offers a post-assessment tool for targeting specific vocational rehabilitation. Finally, it can be used for evaluating theoretical models of executive functions. Future studies creating a children's version of the task are planned.

Correspondence: *Ashok Jansari, School of Psychology, University of East London, Water Lane, London E15 4LZ, United Kingdom. E-mail: a.jansari@uel.ac.uk*

**G. ROBINSON, T. SHALLICE, M. BOZZALI & L. CIPOLOTTI. The Frontal Lobes, Strategy Use and the Hayling.**

**Objective:** The Hayling Test (Burgess & Shallice, 1997) has become a widely used clinical test of frontal 'executive' function. The Hayling task involves the processes of verbal initiation and suppression, with patients asked to complete a sentence with a word that is connected or unconnected in meaning. Although frontal patients are known to produce fewer words that show the use of a strategy (Burgess & Shallice, 1996), the nature of strategy use and localisation within the frontal region remains uninvestigated. This study aimed to investigate strategic processes on the Hayling Test in patients with focal frontal and posterior lesions.

**Participants and Methods:** Patients with unselected focal frontal and non-frontal lesions were included on the basis of their imaging. Baseline cognitive tests and the Hayling Test were administered to patients and education, age and sex matched controls. Responses on the Hayling Test were analysed for strategy type. Lesions were analysed by traditional anterior/posterior and left/right frontal subdivisions as well as a more fine-grained frontal localisation. Thus, patients with right and left Lateral lesions were compared to patients with superior and inferior Medial lesions.

**Results:** The Hayling Test was confirmed to be sensitive to frontal damage. For the unconnected completion condition, frontal impairments were found for response times and errors. Frontal patients also produced fewer responses on the connected completion condition. The error analysis revealed frontal patients used a number of different strategies (e.g., semantic, visual) and that patients with left and right frontal lesions showed a contrasting pattern for strategy type and response time.

**Conclusions:** Frontal lobe damage impacts strategic processes, as well as verbal suppression and initiation, as measured by performance on the Hayling test. The results are discussed with reference to current theories of prefrontal function and the implications for use of the Hayling Test in clinical settings.

Correspondence: *Gail Robinson, University of Queensland, Psychology, St Lucia, Brisbane, QLD 4072, Australia. E-mail: g.robinson@psy.uq.edu.au*

**D.E. TUCK & C.E. SKILBECK. Diagnostic Classification Systems and Personal Demographics are Poor Predictors of Cognitive Recovery following TBI.**

**Objective:** Diagnostic classifications of severe, moderate or mild TBI are based on depth of coma and the duration of the patient's unconsciousness and post-traumatic amnesia. These measures, in concert with individual demographic factors, are often used to form prognoses for the recovery of cognitive functioning. This study aimed to quantify the prognostic accuracy for classification systems and personal demographics following TBI. The study further aimed to investigate the potential for improved prognostic accuracy by incorporating early neuropsychological assessment.

**Participants and Methods:** 264 participants (male 66%, M Age 38.9, SD 16.7) who had experienced a TBI participated in this longitudinal study. Diagnostic and demographic factors were collected following their admission to the Royal Hobart Hospital, and all participants underwent a neuropsychological assessment within 14 days following their injury. Cognitive assessments of working memory, executive functioning, and speed of information processing were then undertaken at three and six months following injury.

**Results:** Results of regression analyses consistently illustrated that diagnostic and demographic factors alone are very poor predictors of cognitive outcome, accounting for only 2.6 to 13.1 percent of the variance in cognitive outcomes. However, prognostic accuracy was consistently improved by incorporating data collected during early neuropsychological assessment. The inclusion of this data accounted for 55.2 to 62.4 percent of the variance in outcomes.

**Conclusions:** Diagnostic classification factors of TBI are insufficient to provide accurate prognoses of cognitive recovery. However, prognostic accuracy can be significantly improved if the patient receives brief neuropsychological assessment shortly following their injury. The adoption of routine cognitive evaluation for all TBI patients would lead to more accurate prognoses of recovery, and assist in identifying those patients who will require ongoing review and rehabilitation.

Correspondence: *David E. Tuck, DPsych (Clinical), Psychology, University of Tasmania, 34 Kelly Street, Battery Point, TAS 7004, Australia. E-mail: detuck@utas.edu.au*

## Student Research Symposium:

Chair: Sommer Thorgusen

10:30 a.m.–12:00 p.m.

**S.R. THORGUSEN. Student Research Symposium.**

**Symposium Description:** In an effort to increase opportunities for student involvement, the Student INS Committee (SINS) is holding a student-organized research symposium. This symposium is designed to highlight students who serve as a model for excellence in student research in neuropsychological science and to foster support for the recognition of student contributions to the field. Speakers were selected from among all student abstract submissions for their exceptional student work, which provides a novel contribution to the field of neuropsychology.

Correspondence: *Sommer R. Thorgusen, M.S., Psychology, 380 S 1530 E, Room 502, Salt Lake City, UT 84112. E-mail: sommer.thorgusen@hsc.utah.edu*

**A.J. LATHAM, L. PATSTON & L. TIPPETT. Expert Video-Gamers Performing Line-Bisection Task Show Enhanced but Lateralised Visuospatial Attention.**

**Objective:** This study assessed whether video-game expertise influences performance during line bisection. Normal right handers typically bisect lines to the left of true centre. If expertise in video-gaming developed during childhood enhances visuospatial attention to both sides of space and can shape underlying neural networks then like expert musicians, expert video-gamers should bisect lines more accurately and show less left bias.



**Participants and Methods:** Fifteen male expert video-gamers, 15 matched controls, and 20 expert musicians (9 female) bisected 2 sets of 17 horizontal lines of differing lengths on a page, once with each hand. Bisection scores comprised percentage deviation and absolute percentage deviation from the midpoint for each line.

**Results:** A repeated measures ANOVA of deviation scores, covarying for gender, revealed that the control group bisected lines significantly further to the left than expert musicians who showed deviation to the right of centre. Expert video gamers did not differ significantly from either group, but did show left deviation. Analysis of absolute percentage deviation scores, covarying for gender, revealed that both expert video-gamers and expert musicians bisected lines significantly more accurately than controls, but did not differ from each other.

**Conclusions:** Our results suggest that expert video-gamers, like expert musicians, possess enhanced visuospatial attention facilitating more accurate bisections, despite not showing reduced lateralised responding. Enhanced and balanced spatial attention in expert musicians is thought to result from extensive training during childhood, when the brain is most malleable and when successful performance is contingent upon bilateral recruitment and integration of diffuse cortical regions. Training leading to expertise in these video-gamers has produced enhancement but no change in lateralisation of visuospatial attention, possibly due to task idiosyncrasies or expertise requirements.

Correspondence: *Andrew J. Latham, Psychology, University of Auckland, 40 The Parade, Bucklands Beach, Auckland 2012, New Zealand. E-mail: alat028@aucklanduni.ac.nz*

**M. WILSON-CHING, V.A. ANDERSON, L.W. DOYLE & P.J. ANDERSON. Varying academic outcomes in extremely preterm/extremely low birth weight adolescents are related to distinct profiles of attentional deficits.**

**Objective:** The present study sought to assess academic skills in a group of extremely preterm/extremely low birth weight (EP/ELBW) adolescents in light of their attentional functioning. It was predicted that the adolescents born EP/ELBW exhibiting attention difficulties would also exhibit lower scores on academic measures, in comparison to adolescents born EP/ELBW who did not exhibit attention difficulties.

**Participants and Methods:** Eighty-three adolescents born EP/ELBW and 49 adolescents born full term/normal birth weight (FT/NBW) were included in this study. A neuropsychological model of attention was employed to evaluate selective, sustained, shifting, and divided attention skills in the EP/ELBW and FT/NBW groups. Scores less than -1 SD from the FT/NBW mean in a test score for a particular attentional area were classified as an attentional difficulty. Academic performance was evaluated with the WRAT4 and was compared between subgroups of EP/ELBW with different profiles of attentional impairments and those who exhibited no attentional difficulties.

**Results:** Subgroups of EP/ELBW adolescents with attention difficulties performed significantly worse than the EP/ELBW subgroup with no attention difficulties. The mean for the EP/ELBW subgroup with difficulties in shifting attention fell between -0.8 and -0.9SDs below the mean of the EP/ELBW subgroup with no difficulties ( $p < .05$ ). For the EP/ELBW subgroup with difficulties in shifting and selective attention mean differences fell between -0.8 and -1.7 SDs below the mean ( $p < .05$ ).

**Conclusions:** EP/ELBW adolescents have selective attention difficulties which influence academic functioning. The development of educational interventions in very preterm populations should target the needs of children with different attentional impairments.

Correspondence: *Michelle Wilson-Ching, Murdoch Childrens Research Institute, Flemington Road, Parkville, VIC 3052, Australia. E-mail: mwilsonch@gmail.com*

**C.S. THOMPSON, N.A. MCNAIR, K. KENNEDY, U. ANTIA, S. WANNENBURG, A. SHELLING, B. RUSSEL, J. HAMM, K. WALDIE & K. IAN. Brain-Derived Neurotrophic Factor val66met Polymorphism Influences The Magnitude Of Human Long-Term Potentiation Which Predicts Memory Performance.**

**Objective:** Brain-derived neurotrophic factor (BDNF) has been identified as an important modulator of synaptic plasticity in animals and humans. A single nucleotide polymorphism in the BDNF gene resulting in a valine-to-methionine substitution at codon 66 (val66met) has been

shown to affect regulation of BDNF and is associated with poorer memory. It has been hypothesized that this polymorphism affects long-term potentiation (LTP) in humans, but this has not been confirmed due to difficulties in measuring LTP in humans. The present study tested whether the BDNF val66met polymorphism was associated with LTP in humans. We also tested whether LTP and BDNF val66met polymorphism was predictive of memory

**Participants and Methods:** 20 healthy participants (10 females) were recruited. Blood was taken and DNA samples were extracted of the 113 base-pair polymorphic BDNF section, with participants defined as Val-Val, Val/Met or Met/Met. EEG was used to record changes in amplitude of visual evoked potentials (VEP), and the WMS-III was used to measure visual memory

**Results:** Val/Val variants had significantly higher VEP amplitude increase compared to individuals with a Met allele ( $p < .05$ ). Val/Val variants also performed significantly better on measures of visual memory ( $p < .05$ ). The degree of LTP also significantly predicted memory score ( $p < .05$ )

**Conclusions:** This study provides evidence that BDNF affects LTP in humans, as well as the first functional evidence of LTP in humans.

Correspondence: *Christopher S. Thompson, PhD, Psychology, University of Auckland, Private Bag 92019, Auckland 1142, New Zealand. E-mail: chris.thompson@auckland.ac.nz*

**J.A. BROWN, J.F. CARTER, J.J. RUCKLIDGE & P.R. JOYCE. Neuropsychological Functioning and Illness Characteristics in Young Adults Who Have Bipolar Disorder with Childhood ADHD: A Comparison with Bipolar Disorder without Past ADHD, ADHD, and Control Groups.**

**Objective:** Almost all neuropsychological studies of adult bipolar disorder (BD) have failed to control for the established cognitive effects of ADHD. ADHD comorbidity in BD is common and can amplify clinical impairment. This study of young adults (16 - 34 years) aimed to establish whether BD individuals with childhood ADHD represent a high risk subgroup in terms of neuropsychological functioning and illness characteristics.

**Participants and Methods:** BD with ( $n = 18$ ) or without ( $n = 66$ ) childhood ADHD groups were recruited (using SCID-I and SADS-L) from a therapy study, and ADHD ( $n = 27$ ) and control ( $n = 26$ ) groups were recruited (using SCID-I, CAADID and CAARS) from the community. Participants completed tests of executive functioning, memory, attention and psychomotor speed.

**Results:** After adjusting for covariates (e.g. mood severity), MANOVA results for cognitive performance indicated that the BD with childhood ADHD group did not differ significantly from the other three groups. The ADHD group was impaired relative to the BD without past ADHD and control groups on measures of attention, verbal and visual memory. The BD without past ADHD group had visual memory and attention difficulties relative to controls. The BD with childhood ADHD group had the highest rates of child abuse and lifetime comorbid axis I disorders. It also had a more severe course of BD relative to the other BD group: earlier onset of BD and depression, greater frequency and severity of manic episodes.

**Conclusions:** Childhood ADHD may define an early onset phenotype of BD with a clinical profile which is severely impaired, even when compared to ADHD. Neuropsychological assessment may fail to distinguish BD with Childhood ADHD from ADHD or other BD subgroups. Childhood abuse may manifest as behaviours resembling ADHD and BD.

Correspondence: *Jason A. Brown, BA(Hons)(First Class), Psychology, University of Canterbury, Psychology Department, University of Canterbury, Private Bag 4800 Christchurch, New Zealand, Christchurch Private Bag 4800, New Zealand. E-mail: jab150@student.canterbury.ac.nz*

**C. MITCHELL & J. DOUGLAS. Coping with Communication Breakdown: A Comparison between Adults with Severe Traumatic Brain Injury and Healthy Controls.**

**Objective:** Traumatic Brain Injury (TBI) commonly affects the communication, cognition and social functioning of the individual. As a result, people with TBI often experience breakdown in interpersonal communication. The aim of this study was to compare the

communication-specific coping strategies used by adults with severe TBI with those used by healthy adults. It was hypothesised that TBI participants would report using fewer productive strategies and a greater number of non-productive strategies than healthy controls. It was also expected that the TBI participants' perceptions of their strategy use would differ from the perceptions of those with whom they communicated regularly.

**Participants and Methods:** Participants included 24 adults with severe TBI (posttraumatic amnesia > 7 days) and 24 controls matched for gender, age and education. Each participant recruited one close other. Communication-specific coping was evaluated using a new tool, the Communication Coping Questionnaire (CCQ). The CCQ has acceptable internal consistency ( $\alpha > 0.80$ ) and temporal stability ( $r > 0.80$ ). Group comparisons were analysed using mixed 2 X 2 ANOVA. Independent and paired t-tests were used to test planned comparisons.

**Results:** TBI participants reported using productive strategies at similar frequency to healthy controls, although they reported using non-productive strategies significantly more frequently. Significant differences emerged between TBI participants' and their close-others' reports of the non-productive strategies used.

**Conclusions:** Adults with severe TBI respond differently to communication breakdowns than healthy controls. They use non-productive communication-specific coping strategies more often than productive strategies to overcome misunderstandings. Consequently, people with severe TBI are less likely to repair communication breakdown. Therefore, it is important to broaden the focus of intervention to target the use of productive coping strategies in situations characterised by failure in message transfer.

Correspondence: *Jacinta Douglas, PhD, Human Communication Sciences, La Trobe University, Kingsbury Drive, Bundoora, VIC 3086, Australia. E-mail: J.Douglas@latrobe.edu.au*

### K.L. WALLACE & E.A. SHORES. The Chinese Australian Neuropsychological Normative Study (CANNIS) and Education Effects on The Rey-Osterrieth Complex Figure (ROCF) Test.

**Objective:** Cultural heterogeneity is becoming increasingly commonplace in western nations. Chinese Australians are one of the largest and fastest growing culturally and linguistically diverse (CALD) communities in Australia. The CANNIS study was undertaken in response to a need to provide clinically relevant norms and to investigate the effects of demographic variables on test performance in this population.

The majority of studies investigating the effects of education on ROCF test performance have found little or no correlation between education and either copy or recall scores (mostly ranging from 0.01 to 0.2). However, relatively robust correlations between education and ROCF measures have been reported in previous CALD studies (e.g., Ardila & Rosselli, 2003). We hypothesized that we would see a similar effect in our CALD sample.

**Participants and Methods:** The CANNIS sample consists of  $n=146$  (57 males; 88 females) community dwelling overseas born ethnic Chinese with Australian permanent residency status aged 55-87 years (mean age=71.3). With the assistance of a Chinese-speaking interpreter, participants were administered a short battery of common neuropsychological tests, including the ROCF, which is the focus of the current study.

**Results:** Results revealed a much higher correlation between education and both ROCF copy and delayed recall scores (0.39 and 0.34, respectively;  $p < 0.0001$ ) than in previous non-CALD studies.

**Conclusions:** The results suggest possible differential mediating effects of education on visuospatial / memory skills between CALD and western populations and highlight the importance of using education stratified norms for assessment of individuals from CALD backgrounds, even for tests that are purportedly culture-free.

Correspondence: *Karen L. Wallace, Psychology, Macquarie University, PO Box 147, Eastwood, NSW 2122, Australia. E-mail: karen\_wallace@usahs.nsw.gov.au*

## FRIDAY AFTERNOON, JULY 8, 2011

### Session 13: Emotion Processing

1:00-2:30 p.m.

#### S. MCDONALD, J. RUSHBY, J. PEARSON & T. ENGLISH. Impaired automatic processing of emotional faces following severe TBI: A backward masking paradigm.

**Objective:** Research to date has suggested that people with severe traumatic brain injury (TBI) do not show normal automatic orientation and arousal to emotional faces, specifically emotional expressions of anger. However, as the stimuli used are typically presented for relatively long exposure times, the extent to which deficits in responding reflect disruption to the rapid automatic processing of such stimuli is unknown. In this study we examined orientation to facial expressions in people with severe TBI using a backward masking paradigm in order to observe rapid automatic responding to emotional stimuli.

**Participants and Methods:** We examined the skin conductance response (SCR) of 15 people with severe, chronic TBI and 12 control participants without brain damage when viewing facial expressions rapidly presented. Participants were exposed to faces of angry and happy expressions for varying periods of exposure: 30 ms, 80 ms, 250 ms and 600ms. In each case, exposure was immediately followed by a mask which was the same face with a neutral expression.

**Results:** Results indicated that, at each exposure time, there was a significant group x emotion interaction. Normal control participants demonstrated a significant SCR to angry expressions that was greater than their response to happy expressions. The participants with TBI showed a reverse pattern, i.e. a greater response to happy than angry. This pattern was seen even at the very brief 30 ms exposure, despite no participant reporting conscious awareness of seeing an emotional expression.

**Conclusions:** These results suggest that the very early processing of emotionally salient material, specifically expressions of anger, is disrupted following severe TBI.

Correspondence: *Skye McDonald, Psychology, UNSW, Randwick, Sydney, NSW 2052, Australia. E-mail: s.mcdonald@unsw.edu.au*

#### G. MILLON, H. WILLIAMS & R. HEMPEL. Does mirroring of emotions facilitate social understanding?

**Objective:** Survivors of Traumatic Brain Injury (TBI) often have difficulties in social synchrony, possibly due to inefficiency in identifying others' facial expressions. Emotion recognition ability has been linked to the capacity to "mirror" others' expressions. We explored the role of mirroring in emotion recognition and everyday social behaviour in TBI and non-TBI groups.

**Participants and Methods:** Participants were 30 healthy adults and 9 individuals with TBI. We measured: Emotion Recognition with the Multimorph Facial Affect Recognition Task (Blair et al., 2001); participants' Emotional Expression during the Multimorph task with Visual Recognition's eMotion software (Gevers, 2008); Social Functioning with the Social Emotional Questionnaire (SEQ). Executive and attention functions were also assessed.

**Results:** The TBI group was less accurate ( $t(37) = 4.004$ ,  $p < .001$ ) and slower when accurately identifying emotions ( $t(37) = -2.481$ ,  $p < .05$ ); they scored significantly lower on the SEQ ( $t(37) = 2.435$ ,  $p < .05$ ), and took significantly longer to complete the Trail Making Task B ( $t(37) = -4.037$ ,  $p < .001$ , see Figure 2). However, there were no significant differences in Emotional Expressiveness ( $t(37) = -.049$ ,  $p = .826$  n.s.). Hierarchical multiple regressions revealed that TBI severity, emotional expressiveness and divided attention explained significant variation in Social Emotional Questionnaire scores ( $F[3, 34] = 8.30$ ,  $p < 0.001$ ;  $R^2 = 0.42$ ). Severe TBI and lower divided attention predicted lower scores on the SEQ, while increased levels of Emotional Expressivity predicted higher scores on the SEQ.

**Conclusions:** This study gives some evidence for Simulation Theory (Goldman, 1989), whereby emotional activity is modulated by action representation: the more expressive someone is, the more they may imitate the facial expressions of other people. Individuals with TBI may benefit from "mirroring" based interventions to improve social synchrony.

Correspondence: *Huw Williams, Exeter University, Washington Singer Labs, EXeter ex44qg, United Kingdom. E-mail: w.h.williams@ex.ac.uk*

**A.R. ADLAM, B. DUNN, F. GRACEY & M. ADAMS. Empathy in Adult Survivors of Traumatic Brain Injury: The Role of Emotion Recognition and Interoception.**

**Objective:** Traumatic brain injury (TBI) is a common cause of disability affecting social participation. This can be accompanied by a breakdown in meaningful relationships and a loss of social role. The processes underlying the social deficits following TBI are poorly understood. Theories of social cognition suggest that our ability to recognise, understand, and respond to the emotions of another person enables us to interact effectively in the social world. These theories posit a role for emotion simulation (an internal representation of the other person's emotion) in both emotion recognition and empathy, with recent studies suggesting that detectible body-state changes occur when observing emotion in others. It is postulated that it is the perception of our own body-state changes (interoception) that occur when seeing an emotion expressed by another person, which enable us to recognise their emotion and, therefore, respond appropriately (empathy). This study aimed to investigate the role of interoception and emotion recognition in empathy in survivors of TBI.

**Participants and Methods:** Twenty-seven adult survivors of TBI and 36 age-, sex-, and premorbid IQ matched controls completed measures of interoception (heartbeat perception; Schandry, 1981), emotion recognition (facial expressions; Tottenham et al., 2002) and empathy (self- and relative- ratings; Baron-Cohen & Wheelwright, 2004).

**Results:** Unexpectedly, survivors of TBI showed no significant impairments on measures of interoception relative to controls, despite impairments on measures of emotion recognition and empathy. Furthermore, no significant relationships were found between measures in either group.

**Conclusions:** Consistent with previous research, survivors of TBI showed deficits on measures of emotion recognition and empathy. The lack of significant associations between the measures, and the lack of differential body-state responses when performing the emotion recognition task, suggests that recognising emotion in others might not involve body-state perception.

Correspondence: *Anna-Lynne R. Adlam, PhD, Psychological Sciences, UEA, Norwich Medical School, UEA, Norwich NR4 7TJ, United Kingdom. E-mail: a.adlam@uea.ac.uk*

**J. RUSHBY, S. MCDONALD & A. DE SOUSA. Understanding Deficits in Empathy After Severe Traumatic Brain Injury.**

**Objective:** Severe traumatic brain injury (TBI) often leads to marked difficulties in the domains of empathy, emotional responsivity, and emotional regulation. However, the relationship between domains, if any, is unclear. The present study examined this relationship in a sample of participants with severe TBI.

**Participants and Methods:** 21 participants with severe TBI and 25 controls participated. Six film clips containing pleasant, unpleasant and neutral content were presented whilst facial EMG and skin conductance (SC) were measured. Self-reported emotional empathy questionnaires, and a range of neuropsychological tests were also administered. A close relative of each TBI participant completed the Current Behaviour Scale (CBS) to assess for changes in emotional control and drive occurring as a consequence of the injury.

**Results:** In comparison to control participants, those in the TBI group displayed a reduction in the ability to empathize emotionally. Further, TBI participants showed an impaired pattern of facial mimicry to both pleasant and unpleasant films. They also exhibited lowered autonomic arousal, particularly to unpleasant films. Despite failing to find a relationship between emotional empathy and physiological responding, relative reported loss of drive was significantly related to poor empathy, whereas, loss of emotional control was associated with heightened empathy levels in this population.

**Conclusions:** The results suggest that level of emotional empathy post injury is associated with disorders of drive or control. This has important implications for understanding and treating empathy deficits following TBI.

Correspondence: *Jacqueline Rushby, PhD, Psychology, University of New South Wales, School of Psychology, UNSW, Randwick, NSW 2031, Australia. E-mail: j.rushby@unsw.edu.au*

**D. MATHERSUL & S. MCDONALD. Understanding Complex Theory of Mind in Adults with Asperger's: Sarcasm versus Deception.**

**Objective:** Individuals with Asperger's are generally thought to have poor Theory of Mind (ToM), which may explain their marked impairments in social interaction. An important factor to consider when investigating ToM is the ecological validity of the task employed. The Awareness of Social Inference Test (TASIT; McDonald, Flanagan, & Rollins, 2002) provides a closer association to real-life situations than traditional paper-based ToM tasks via the use of video vignettes depicting conversational exchanges. It also allows for the investigation of subtle deficits in complex ToM (eg understanding sarcasm and deception). The aim of the present study was to investigate both simple and complex ToM in adults with Asperger's using TASIT, a more ecologically valid task than traditionally employed. An additional aim was to explore the effect of monetary reward on accuracy.

**Participants and Methods:** Twenty-one adults with Asperger's (18-64 years) were matched to seventeen typically developing control individuals by age, gender, IQ, and years of education. Individuals were randomly allocated to two conditions within each group (monetary reward versus control) and their performance on TASIT examined.

**Results:** There were no significant effects of condition. The Asperger's group were significantly impaired on understanding deception ( $p < .05$ ) but not sincerity or sarcasm. Specifically, while their ability to understand the beliefs and feelings of someone lying were intact, they were significantly impaired on understanding intentions ( $p < .05$ ) and meaning ( $p < .02$ ).

**Conclusions:** ToM deficits in individuals with Asperger's are subtle and specific. While the comprehension of sarcasm and deception both require complex ToM, these individuals show deficits only in understanding deception. Specifically, while they appeared to understand the content of the deception, they were impaired in their ability to use that information to further infer others' intentions, and explain why someone might lie.

Correspondence: *Danielle Mathersul, University of New South Wales, School of Psychology, University of New South Wales, Sydney, NSW 2052, Australia. E-mail: dmathersul@psy.unsw.edu.au*

**M. KELLY, S. MCDONALD, J. RUSHBY & D. KELLETT. Evidence for the Construct Validity of a Novel Social Decision Making Task.**

**Objective:** Decision making forms an important part of our everyday lives and is commonly impaired after a severe traumatic brain injury (TBI). This study aimed to establish construct validity for the Social Decision Making Task (SDMT).

**Participants and Methods:** The SDMT is a novel task where participants are required to play a game of 'catch and throw' with four pseudo players over the internet. Two pseudo players are regarded 'good choices' as they return the ball at a probability of 60% or 30%; the other two players are 'bad choices', returning the ball at a probability of 10% or 0%. Behavioural data are presented for 26 adults with severe TBI (PTA  $M = 55.56$  days), aged between 24 and 66 years ( $M = 43.85$ ) tested at least 8 months post-injury ( $M = 4.5$  years). These were compared to 12 control participants matched for age and years of education.

**Results:** Significant differences were observed between the TBI and control group on the SDMT, with controls making better decisions overall. A significant relationship was observed between performance on the SDMT and visuospatial learning; however, no significant relationships were observed with working memory or attention. Additionally, we observed a significant correlation between The Awareness of Social Inference Test and performance on the SDMT, however, no significant correlations with other tests of theory of mind were observed. Finally, adequate retest reliability was established for this task.

**Conclusions:** The SDMT will assist in the understanding of social decision making impairments in the context of circumventing social isolation for individuals with a traumatic brain injury.

Correspondence: *Michelle Kelly, Psychology, University of New South Wales, School of Psychology, University of NSW, Sydney, NSW 2052, Australia. E-mail: mkelly@psy.unsw.edu.au*

**Session 14:  
Acquired Brain Injury Outcomes**

**1:00–2:30 p.m.**

**G. SPITZ, J. PONSFORD & J. MALLER. Injury Severity, Coping, and Neuropsychological Functioning: The Relationship to White Matter Integrity Following Traumatic Brain Injury (TBI).**

**Objective:** Diffusion tensor imaging (DTI) detects changes in white matter previously undetected by CT and conventional MRI sequences. The purpose of this study was to examine whether injury severity, coping, and cognition was associated with the integrity of underlying white matter tracts following TBI.

**Participants and Methods:** Twenty-seven participants with mild to severe TBI completed measures of coping and neuropsychological functioning on average 15 months post-injury. MRI scans were undertaken using a 3T Siemens scanner, and fractional anisotropy (FA) values were obtained for the corpus callosum (CC), superior longitudinal fasciculus (SLF), inferior longitudinal fasciculus (ILF), internal capsules (IC), and the cingulate. Correlations were used to examine the relationship between injury severity, coping, neuropsychological, and white matter tracts.

**Results:** Lower post-traumatic amnesia (PTA) values were associated with high FA values in the SLF, ILF, and the cingulate. Frequent use of productive coping strategies was related to higher FA values in the SLF and the IC. Better performance on memory, executive, and attention domains was associated with greater white matter integrity in the IC, SLF, ILF. However, the CC and cingulate were unrelated to neuropsychological performance.

**Conclusions:** Results indicated that the integrity of white matter tracts may be a valuable indicator of functioning following TBI. However, this study provides only preliminary data that need to be followed up with larger studies capable of undertaking more complex data analysis.

Correspondence: *Gershon Spitz, Psychology and Psychiatry, Clayton Campus, Wellington Road, Clayton, Melbourne, VIC 3800, Australia. E-mail: gershon.spitz@monash.edu*

**C.J. WILLMOTT, J.L. PONSFORD & T.W. MCALLISTER. Effect of COMT Val/Met Genotype on Attention and Response to Methylphenidate Following Traumatic Brain Injury.**

**Objective:** The present study aimed to investigate whether catechol-O-methyltransferase (COMT Val158Met) allele status was associated with i) attentional performance, and ii) response to methylphenidate (MP), following traumatic brain injury (TBI).

**Participants and Methods:** 40 healthy controls and 32 moderate - severe TBI patients (Mean time post-injury = 68 days) participated in an initial baseline cognitive assessment. The TBI cohort then participated in a randomised, crossover, double blind, placebo controlled 2 week MP trial. MP was administered at a dose of 0.3mg/kg bd.

**Results:** TBI genotype distribution: val/val n=11; val/met n=14; met/met n=7. There were no significant differences across genotypes with regard to demographics or injury severity ( $p > .05$  for all). There were no significant differences across genotypes on baseline attentional measures, however there was an overall trend for the met/met group to demonstrate faster performance. When compared with healthy controls, the val/val group performed significantly more poorly on nearly all measures. The met/met group performed more poorly than controls on measures of speed, but not on tasks requiring strategic control of attention. MP resulted in significantly faster speed of information processing across a range of measures. Repeated measures mixed ANOVAs found only one significant drug x genotype interaction: ( $F(2,29) = 4.257, p = .024$ ) the met/met group demonstrated a greater response to MP on the Symbol Digit Modalities Test.

**Conclusions:** COMT allele status was not strongly associated with attentional performance or response to MP in the TBI sample. There was some suggestion that the met/met group, whilst slow, had relatively preserved strategic control of attention.

Correspondence: *Catherine J. Willmott, PhD, Psychology, Building 1/270 Ferntree Gully Road, Notting Hill, VIC 3168, Australia. E-mail: catherine.willmott@monash.edu*

**J. PONSFORD & L. TWEEDLY. The Relationship between Alcohol and Cognitive Functioning after Traumatic Brain Injury.**

**Objective:** Traumatic brain injury (TBI) frequently causes continuing disability. One factor associated with poorer medical, neurobehavioural, vocational and life satisfaction outcomes is substance abuse. However due to lack of pre-injury information in studies to date it is difficult to establish whether this reflects the influence of pre-existing cognitive or psychosocial problems or whether substance use exacerbates the impact of TBI on the brain and cognition. The aim of this study was to examine the association of frequency and quantity of alcohol consumption with cognitive functioning following TBI; specifically the association of 1) pre-injury alcohol use, and 2) post-injury alcohol use on cognitive function 6-9 months following TBI; and to examine the influence of post-injury alcohol use on cognitive recovery over a six-month period.

**Participants and Methods:** Participants were 60 patients with moderate-severe TBI assessed 6-9 months post-injury and reassessed 6 months later. Measures of alcohol consumption included the AUDIT and Time Line Follow Back. Cognitive measures included the NART, Symbol Digit Modalities Test (SDMT), California Verbal Learning Test (CVLT) and Modified Six Elements Test (MSET).

**Results:** There was no significant association between pre-injury alcohol use and cognitive performance 6-9 months post-injury. However higher alcohol use 6-9 months post-injury was associated with poorer executive function on the MSET 6-9 months post-injury. Moreover higher alcohol consumption was associated with less recovery of processing speed and short term memory over a 6-month period.

**Conclusions:** These findings suggest that post-injury alcohol use does have a deleterious impact on cognitive function and recovery. Interventions to minimise post-injury alcohol use are warranted.

Correspondence: *Jennie Ponsford, PhD, School of Psychology and Psychiatry, Building 17, Wellington Road, Clayton, VIC 3800, Australia. E-mail: jennie.ponsford@monash.edu*

**T. OWNSWORTH, J. SILVA, C. SHIELDS & J. FLEMING. Post-traumatic growth of individuals with acquired brain injury and their caregivers during community reintegration.**

**Objective:** Preliminary research supports that acquired brain injury (ABI) can bring about positive psychological changes for individuals and family caregivers. This study investigated the impact of early subjective impairment and emotional distress on post-traumatic growth (PTG) at six-months post-discharge for individuals and caregivers.

**Participants and Methods:** Sixty participants (73% male) with ABI (Mean hospitalisation = 32.92 days, SD = 40.74) and their caregiver partner/spouse ( $n = 34$ ) were consecutively recruited at discharge from inpatient rehabilitation and administered the Mayo-Portland Adaptability Index - 4 (MPAI-4) and Depression, Anxiety Stress Scales (DASS). At six-months post-discharge participants were administered the Post-Traumatic Growth Inventory, DASS and MPAI-4.

**Results:** Individuals with greater subjective impairment at discharge endorsed a higher level of PTG at six months follow-up ( $\beta = .40, p < .05, sr^2 = .28$ ). At follow-up, increased appreciation of life was significantly related to greater subjective impairment ( $p < .01$ ) and depressive symptoms ( $p < .01$ ). Caregivers reporting greater emotional distress at discharge endorsed significantly higher PTG in the area of new possibilities ( $p < .05$ ) at 6-months follow-up. Increased appreciation of life was the most commonly endorsed aspect of PTG for both participant groups; however, caregivers were more likely to perceive enhanced personal strength than individuals.

**Conclusions:** Overall, these findings indicate that during community re-integration individuals who perceive greater functional consequences of their ABI are more likely to report PTG; however, their efforts to re-evaluate priorities and values in life may elicit emotional distress. For caregivers, early emotional distress may initiate a process of change and adaptation. Further longitudinal research is needed to better understand factors promoting PTG over time.

Correspondence: *Tamara Ownsworth, PhD clinical neuropsychology, Griffith University, School of Psychology, Mt Gravatt, Brisbane, QLD 4113, Australia. E-mail: t.ownsworth@griffith.edu.au*

**L.T. MOUNCE, H. WILLIAMS, H. ADRIAN, J.M. JONES, A.S. HASLAM & J. JETTEN. The Neurological And Psychological Roots Of Post-Concussion Syndrome After MTBI: The Role Of Traumatic Re-Experiencing.**

**Objective:** The provenance of post-concussion syndrome (PCS) following mild traumatic brain injury (MTBI) remains controversial. Similar rates are evident in those with other traumatic injuries, as well as post-traumatic stress disorder (PTSD). We aimed to identify which PCS symptoms are specific to MTBI at 2 weeks and 3 months post-injury through comparison with orthopaedic controls. We predicted that symptoms of headaches, dizziness and nausea would be greater in the MTBI group, but that overall levels of PCS would be comparable. Finally, we report a model of the contributors to persistent PCS.

**Participants and Methods:** The sample of consecutive Emergency Department admissions consisted of 110 MTBIs and 47 controls at 2 weeks post-injury, and 60 MTBIs, and 33 controls at 3 months. Participants completed the Rivermead Post-concussion Symptom Questionnaire and the Trauma Screening Questionnaire for PTSD.

**Results:** At both time points, overall rates of PCS were comparable between those with MTBI and controls, though MTBI resulted in significantly more headaches, dizziness and nausea. Controlling for demographic and pre-morbid factors, a hierarchical linear regression and path analysis found that acute PCS levels and symptoms of traumatic re-experiencing led to persistent PCS.

**Conclusions:** MTBI may result in persistent neurological symptoms, but psychogenic post-traumatic complaints also develop after traumatic injury, as evidenced by the significant role played by re-experiencing symptoms and PCS levels in controls. Interestingly, the somatic/affective PTSD symptoms, which overlap with PCS, were not found to contribute. Screening for acute symptoms and traumatic re-experiencing may enable identification of those at risk of PCS after traumatic injury. Correspondence: *Luke T. Mounce, Centre for Clinical Neuropsychological Research, University of Exeter, Washington Singer Laboratories, Perry Road, Exeter EX4 4QG, United Kingdom. E-mail: L.Mounce@exeter.ac.uk*

**H.J. RYLAND, W.H. WILLIAMS, M. TURNER & J. MURRAY. Does Sports Concussion Have Long Term Neurocognitive Consequences?**

**Objective:** Concussion may lead to symptoms of cognitive disturbance, affective and somatic complaints for hours, days or possibly weeks. We report 3 studies exploring whether there were neurocognitive consequences in jockeys with sports concussion who were monitored for the British Horseracing Authority.

**Participants and Methods:** For 3 studies the jockey population (N = 1975) for which there was data, e.g., baseline (annual) test/trackside assessment and who met the inclusion criteria (no alcohol prior to testing) were selected. We also note that RCIs were calculated to determine the effects of serial testing. In Study 1 jockeys who had incurred a concussion (n = 32) were compared with controls on neurocognitive measures administered at least 4 months post-concussion. In Study 2 the impact of severity in terms of short-term LOC/PTA (n = 17) versus extended LOC/PTA (n = 18; extended being LOC and/or PTA for > 1 minute) was analysed to determine whether initial symptoms predict outcome. In Study 3 repeat concussions (n = 14) were investigated to determine whether performance declined in relation to single concussions and controls.

**Results:** Analyses using repeated measures ANOVA and RCIs showed that those with one concussion were found to have a subtle but significant decline for Stroop (mean z scores: control = 0.20, concussed = -0.30) and Trails B (control = 0.08, concussed = 0.63) compared to controls. Controls' performance was worse in Digit Span. In Study 2 there were no differences in outcome irrespective of severity, other than again controls' worse performance in Digit Span. In Study 3 we did not find those with repeat injury to differ from the singles or controls.

**Conclusions:** These results may suggest that whilst subtle negative neurocognitive sequelae may persist following a single concussion, decrements found are small. This reinforces the hypothesis that sports concussion is a short-term problem. Future research could investigate more precisely the length of these short term decrements.

Correspondence: *Helen J. Ryland, BSc Econ, BSc, MSc, College of Life and Environmental Sciences, University of Exeter, Washington Singer Labs, Perry Road, Exeter EX4 4QG, United Kingdom. E-mail: h.j.ryland@ex.ac.uk*

**Symposium:  
From Assessing to Managing Memory in Mild  
Cognitive Impairment: Current Issues in a Clinical  
Context**

**Chair: Glynda Kinsella**

**1:00–2:30 p.m.**

**G. KINSELLA, G.J. KINSELLA, G.J. KINSELLA, K.E. PIKE, R. HUTCHENS & B. RYBURN. From Assessing to Managing Memory in Mild Cognitive Impairment: Current Issues in a Clinical Context.**

**Symposium Description:** An increasing role in clinical neuropsychology within aged care services is to provide diagnostic and management support for people complaining of decline in memory performance. Translating internationally agreed guidelines for the diagnosis of mild cognitive impairment (MCI) or early stage dementia into clinical practice requires ongoing evaluation of the specific methods that are used as part of the diagnostic process. The first two papers in this symposium address debated aspects of the clinical assessment of MCI – firstly, the viability of self-report of memory concerns; and secondly, the evaluation of current clinical measures of associative learning, a key aspect of neuropsychological assessment in early neurodegenerative disorders. The next paper addresses the extent to which strategy knowledge and use of strategies during memory tasks impacts and discriminates the performance of people presenting with MCI as distinct from healthy aging. This is important as early changes in memory performance can be moderated in everyday life by effective use of specific strategies; and, by extending our knowledge about spontaneous strategy use in memory tasks we are providing the foundation for targeted interventions. The final paper will pursue the issue of memory strategies by evaluating whether the common adjunct to clinical assessment of using information handouts about memory strategies for everyday tasks can be effective in addressing clients' memory concerns. Discussion will build upon these frequently encountered issues in the clinical context of assessing and managing MCI.

Correspondence: *Glynda Kinsella, PhD, La Trobe University, Plenty Road, Melbourne, VIC 3086, Australia. E-mail: g.kinsella@latrobe.edu.au*

**G.J. KINSELLA, D. AMES, E. STOREY, B. ONG, K.E. PIKE, S. PARSONS, M. SALING, E. MULLALY, E. RAND & L. CLARE. Subjective Reporting of Memory Complaint in Mild Cognitive Impairment: Comparison of Self and Informant Report.**

**Objective:** Subjective memory complaint is a key feature in determining the amnesic form of mild cognitive impairment (aMCI). The informant questionnaire of cognitive decline in the elderly (IQCODE) provides a useful contribution to the diagnostic process; however, many older people do not have a reliable informant and yet are frequently reporting subjective memory complaints. Therefore, the objective of this study is to evaluate whether a self-report version of the IQCODE (IQCODE-SR) can be reliably used in the clinic when an informant is not available.

**Participants and Methods:** 62 people diagnosed with aMCI and their informants and 62 age and education matched healthy older adults (HOA) and their informants were administered both versions of the IQCODE, the MMSE and several neuropsychological tests of memory.

**Results:** Correlation of the IQCODE-SR and the IQCODE was lower in the aMCI group (r = 0.23) than in the HOA group (r = 0.50). Using receiver operating characteristic (ROC) analysis, the ability to discriminate aMCI from HOA was good for the IQCODE and the MMSE (AUC 0.81 and AUC 0.85, respectively), but was less effective for the IQCODE-SR (AUC 0.72) and on its own did not provide an acceptable area under the curve (i.e. > 0.80). However, when the IQCODE-SR was combined with the MMSE it significantly improved discrimination (AUC 0.83).

**Conclusions:** These findings provide only limited encouragement for including the IQCODE-SR as a screening technique for aMCI when an informant report is unavailable and also highlights the potential of early changes in self-awareness in aMCI.

Correspondence: *Glynda J. Kinsella, La Trobe University, Melbourne, VIC 3086, Australia. E-mail: g.kinsella@latrobe.edu.au*

**K.E. PIKE, G.J. KINSELLA, B. ONG, E. MULLALY, E. RAND, E. STOREY, D. AMES, M. SALING, L. CLARE & S. PARSONS. The Utility of the WMS-IV Verbal Paired Associates in Discriminating Mild Cognitive Impairment from Healthy Aging.**

**Objective:** One of the core clinical measures of memory, the Wechsler Memory Scale, has recently been updated, including the verbal paired associate (VPA) subtest. Paired associate learning tasks are reported to be particularly sensitive to the early and preclinical stages of Alzheimer's disease. The current study aimed to determine the effectiveness of the new VPA in distinguishing the earliest stages of memory impairment (amnestic mild cognitive impairment, aMCI) from normal aging, compared to other standard memory tasks.

**Participants and Methods:** 76 participants with aMCI and 110 healthy older adults (HOA) completed VPA as well as CVLT-II, HVLTR, Logical Memory, and Rey Complex Figure recall.

**Results:** VPA performance distinguished aMCI from HOA with large effect sizes (total learning,  $t(184) = 11.0$ ,  $p < .001$ ,  $d = 1.63$ ; delayed recall,  $t(184) = 10.31$ ,  $p < .001$ ,  $d = 1.52$ ). VPA had larger effect sizes than Rey figure ( $d = 1.29$ ), but smaller than CVLT-II ( $d = 2.50$ ), HVLTR ( $d = 4.16$ ), and Logical Memory ( $d = 2.09$ ). Although VPA scaled score performance also distinguished the groups with large effect sizes (total learning,  $t(184) = 9.73$ ,  $p < .001$ ,  $d = 1.43$ ; delayed recall,  $t(184) = 9.28$ ,  $p < .001$ ,  $d = 1.36$ ), the mean performance of participants with aMCI fell within the average range (total learning  $M = 8.28$ ; delayed recall  $M = 7.95$ ).

**Conclusions:** Thus in the clinical setting, many people with aMCI would not be identified as having memory impairment on this task, suggesting the normative data require further examination before the VPA is useful in clinical practice.

Correspondence: *Kerryn E. Pike, La Trobe University, Melbourne, VIC 3086, Australia. E-mail: k.pike@latrobe.edu.au*

**R. HUTCHENS, G. KINSELLA, B. ONG & K. PIKE. Knowledge and Use of Memory Strategies and Memory Performance in Amnestic Mild Cognitive Impairment Compared to Typical Aging.**

**Objective:** Little research has directly examined strategy use in amnestic mild cognitive impairment (aMCI) and its relationship to memory performance in order to guide the development of successful interventions. The current study aimed to compare strategy knowledge and use between an aMCI and healthy older adult (HOA) sample and to establish the relationship between strategy use and memory performance.

**Participants and Methods:** The sample comprised 35 aMCI and 49 HOA participants aged 60 years or older. All participants completed questionnaires to assess strategy knowledge and self-reported strategy use in everyday life. Observed strategy use and memory performance was measured on the CVLT-II.

**Results:** The aMCI group demonstrated less knowledge of memory strategies than the HOA group, however strategy knowledge was unrelated to strategy use for both groups. On the CVLT-II, the aMCI group demonstrated decreased use of internal strategies (subjective and semantic clustering) in comparison to the control group despite self-reporting equivalent use of internal and external strategies in everyday life. However, through hierarchical regression, use of specific memory strategies on the CVLT-II was predictive of better performance for the aMCI group.

**Conclusions:** These results provide support for the inclusion of strategy training in cognitive interventions for aMCI but suggest that further research is necessary to determine the factors other than knowledge that determine strategy use.

Correspondence: *Rachel Hutchens, La Trobe University, Melbourne, VIC 3086, Australia. E-mail: r14hutchens@students.latrobe.edu.au*

**B. RYBURN, L. VARANELLI & Y. WELLS. How Helpful are our Handouts? An Evaluation of Information Handouts for Clients with MCI and their Family Members.**

**Objective:** Most health professionals hope to empower clients and their families with the provision of information handouts. However, it is rare that we attempt to evaluate the effectiveness of our handouts. Do the majority of clients or their families take them home and read them? Do clients utilise any of the strategies provided, and to what extent does cognitive impairment affect this? Are some handouts more effective than others?

An evaluation of information handouts using telephone interviews with clients and family members is currently underway in a Memory clinic in the south-east of Melbourne.

**Participants and Methods:** We compared outcomes (including client quality of life and wellbeing) for two groups of forty clients and family members: the intervention group, which received a new information resource, and a comparison group, which received 'service as usual'.

**Results:** Of the group receiving 'service as usual', the majority reported reading the handouts they received and finding them of use (67% of family members and 100% of clients), but fewer reported referring to the handouts on an ongoing basis (53% of family members and 42% of clients) or were able to describe which strategies they had adopted (20% of family members and 42% of clients).

**Conclusions:** These initial findings suggest that the handouts provided as part of 'service as usual' may not be a sufficient to educate clients with MCI about the range of cognitive strategies available. This paper will present an overview of the results from the evaluation of the handouts and discuss the broader clinical implications.

Correspondence: *Bridget Ryburn, La Trobe University, Melbourne, VIC 3086, Australia. E-mail: b.ryburn@latrobe.edu.au*

**A. LAMONT. Age-Related Memory Loss: 20 to 95 years: A cross-sectional and longitudinal study of healthy, independent adults.**

**Objective:** Memory decrements have been reported as approximately linear declines from early adulthood until about 80 years of age. Questions arise as to whether declines in memory plateau or accelerate in advanced aging, and to what extent differences are due to aging, per se, or to variables intervening between age and memory.

**Participants and Methods:** To address these questions, six memory types (verbal and nonverbal recall, working, face recognition, short-term, and prospective memory) were examined in three mixed-gender groups of healthy community-dwelling adults (20-40, 50-70, and 85+ years). The memory types were chosen because of their importance to continued independence. Memory tests were administered at two points, with a two-year inter-test interval. Additionally, there were verbal and nonverbal processing speed tasks, and the NART assessing verbal fluency was used to estimate intelligence. The MMSE, SF-36, and BDI-II were used to screen for dementia, physical and mental health, and depression, respectively. Cross-sectional and longitudinal analyses were carried out.

**Results:** An interesting pattern of losses contrasting with relatively well-preserved memory types emerged at Time 1 testing. For some memory types, age-related effects were apparent by the age of 50 years. Two years later, the 85+ year-olds alone demonstrated a further sharp decline for most memory types. The influence of the examined variables increased markedly over the two-year interval only for the oldest-old.

**Conclusions:** These findings support the view that while memory declines may be approximately linear from age 20 to 70+ years, there is a sharp decline in most types of memory in the ninth and tenth decades of normal, healthy aging.

Correspondence: *Allison Lamont, PhD, Massey University, 107 Harewood Road, Christchurch S053, New Zealand. E-mail: a-lamont@xtra.co.nz*

**ASSBI Presidential Address:  
Strategies to Improve the Communicative Interactions  
of People with Traumatic Brain Injury: The Kevin  
Bacon Effect**

**3:00–4:00 p.m.**

**L. TOGHER. ASSBI Presidential Address: Strategies to improve the communicative interactions of people with traumatic brain injury: the Kevin Bacon effect.**

People with severe traumatic brain injury (TBI) can experience serious debilitating communication problems in their everyday interactions. Those affected can be socially inappropriate and uncomfortable to be around, which ultimately leads to lost friendships, unemployment, and social isolation. The causes of these problems are complex and multifaceted and therefore pose a challenge to rehabilitation teams aiming to enhance community reintegration for these patients. Poor communi-

cation skills can lead to a dissolution of social networks and prevent engagement with new networks. Interactions with family and friends may be awkward and unsatisfying, but communication problems can also arise in routine community-based interactions such as during shopping or telephone inquiries. Traditionally, speech-language pathologists have focused on the discourse of the person with TBI, and developed behavioural goals such as improving topic maintenance or social skills. While these approaches have merit, outcomes can be enhanced considerably by also evaluating and training everyday communication partners. This presentation will summarize recent research where families and friends were taught communication strategies designed to improve their everyday conversations.

In some cases, the positive effects extended beyond the interactions of the person with brain injury and the person we trained to enhance other social networks.

The implications of this research suggest increased engagement of families, friends and community service providers in specific communication training programs. It also raises the question of whether training other communication partners such as health care workers may be useful. Current developments in a communication training project for health care workers will also be discussed.

Correspondence: *Leanne Togher, PhD, Speech Pathology, The University of Sydney, PO Box 170, Lidcombe, NSW 1525, Australia. E-mail: leanne.togher@sydney.edu.au*

## SATURDAY MORNING, JULY 9, 2011

### International Keynote Address: Memory in Social Context from Neuropsychology to Psychiatry

Speaker: Hans Markowitch

9:00–10:00 a.m.

#### H. MARKOWITSCH. Memory in social context – from neuropsychology to psychiatry.

Memory constitutes probably the most important part of a personality. It develops phylo- and ontogenetically from simple to complex systems with autobiographical memory being the most complex and latest developing system. Autobiographical memory is constituted in line with the development of the self and the establishment of a social being. The neuropsychology of autobiographical memory will be outlined and the brain bases for memory will be explained. The vulnerability of autobiographical memory is especially obvious in patients with so-called psychogenic (dissociative) amnesia. These patients suffer from environmentally-induced amnesia which was caused by malfunctioning social interactions. Examples for such cases will be given and it will be outlined that interactions between social partners may lead to enduring changes in the brain. Consequently, the environment is a major modulator of brain functions, in particular of memory.

Correspondence: *Hans Markowitsch, Physiological Psychology, University of Bielefeld, Universitaetsstrasse 25, Bielefeld 33501, Germany. E-mail: hjmarkowitsch@uni-bielefeld.de*

#### Session 18: Behaviour, Cognition and Communication in Children

10:30 a.m.–12:00 p.m.

#### A. CRICHTON & K. BAKKER. Assessment of Post Traumatic Amnesia in Children, Determining Best Practice.

**Objective:** There is limited empirical evidence to guide the clinical assessment of Post Traumatic Amnesia (PTA) in children, particularly younger children (<8 years). The literature demonstrates a lack of consensus regarding best practice for PTA assessment; despite the high prevalence of young children with traumatic brain injury. In the absence of scientific evidence, clinical expertise provides a valuable source to inform and guide best clinical practice. The goal of this study was to survey paediatric health care providers to gather information on current clinical opinion and best practice in paediatric PTA assessment.

**Participants and Methods:** A clinical survey of paediatric hospitals and rehabilitation services in Australia and New Zealand was conducted in 2010. The survey included questions about current clinical service and clinical practice in assessment and management of PTA in children. Thirty five individuals responded to the survey across acute inpatient tertiary hospitals, inpatient rehabilitation and outpatient rehabilitation services.

**Results:** Survey data confirmed distinct assessment methods for children as determined by age. There was a clinical consensus on assessment and management of PTA in children over 8, and the use of a standardised assessment tool and behavioural markers of PTA in this age group. Differences in current clinical assessment and management of

PTA in children under 8 years, however, were apparent. Significant findings include the range of assessment tools used to detect PTA in children under 8, in conjunction with key behavioural markers of PTA status. Other markers of brain injury severity (e.g., loss of consciousness) used in clinical practice are also described.

**Conclusions:** Whilst research provides limited findings or data to guide paediatric PTA assessment, results from this clinical survey provide some consensus on best practice and highlight areas of inconsistency in clinical practice. Implications for clinical practice standards and future research are discussed.

Correspondence: *Ali Crichton, D Psych (Clinical Neuropsychology), VPRS, Monash Medical Centre, L 4, 246 Clayton Road, Clayton, VIC 3121, Australia. E-mail: ali.crichton@southernhealth.org.au*

#### J. KENARDY, E. CHARLTON, J. HENDRIKZ, V. ANDERSON, R. LEBROCQUE & L. MCKINLAY. TBI Severity and Post-traumatic Stress Symptoms in Children: The Impact of Pre and Post-injury Variables.

**Objective:** Prior research has indicated that posttraumatic stress symptoms (PTSS) and traumatic brain injury (TBI) can co-occur. This study aimed to determine if there is a relationship between TBI severity and PTSS and whether pre-existing and/or post-injury factors account for this relationship.

**Participants and Methods:** Parents (N=184) completed measures of children's pre and post-injury behaviour at 2 weeks and 3 months post-injury, respectively. At 3 months post-injury 184 children completed the Clinician Administered PTSD Scale – Children/Adolescents and measures of cognitive functioning.

**Results:** Results indicated a trend towards more severe TBI being associated with higher levels of PTSS. Pre-trauma variables assessed for moderation effects included socioeconomic status, age, gender, presence of prior trauma, pre-injury executive functioning and internalising/externalising behavioural problems. Age and internalising/externalising behaviour were independently related to PTSS; however no pre-trauma variables significantly interacted with TBI severity on PTSS. The post-trauma variables assessed for mediation effects included parental distress and three areas of cognitive functioning; attention, working memory and executive function. An indirect effect was found between mild/moderate TBI and PTSS when parental distress was controlled for. None of the cognitive variables had any significant impact on the relationship between TBI severity and PTSS.

**Conclusions:** These results indicate that the relationship between TBI severity and PTSS is independent of any of the pre-existing factors assessed, and independent of the post-injury cognitive variables assessed. However, parental distress has an indirect impact on PTSS regardless of TBI severity.

Correspondence: *Justin Kenardy, CONROD, The University of Queensland, Ground Floor, Edith Cavell Building, Brisbane, QLD 4029, Australia. E-mail: j.kenardy@uq.edu.au*

#### N. BARRE, A. MORGAN, D. THOMPSON, L. DOYLE & P.J. ANDERSON. Language abilities in children born very preterm and the role of the early environment.

**Objective:** Language abilities in children born very preterm have not been well characterised. The aim of this study was to characterise the language abilities in children born very preterm and examine the mechanisms by which the early environment influences these abilities.

**Participants and Methods:** A group of very preterm infants (n=225; <30 weeks' gestation or <1250g) was recruited at birth from the Royal

Women's Hospital, Melbourne and a term control group ( $n=77$ ;  $\geq 37$  weeks' gestation and  $\geq 2,500$ g) was also recruited. During the neonatal period infants had an MRI brain scan and degree of grey and white matter abnormality was rated according to an established scoring system. At corrected age 7 years, phonological awareness, semantics, grammar, discourse and pragmatics were assessed using the CELF-IV and other measures. Measures of the distal and proximal environment were collected from parent rated questionnaires.

**Results:** Analyses showed that very preterm children performed significantly worse than term children in all five language sub-domains assessed (all  $p < .001$ ). Measures of the environment were related to language abilities in very preterm children, particularly measures of the distal environment. There was some indication that the effect of the environment differed depending on the degree of white matter injury.

**Conclusions:** Language is clearly an area of concern for many very preterm children. Consistent with theories of language development, we found language function in very preterm children to be partly related to environmental factors such as social risk. Understanding the role of early environmental influences may assist in the development of preventative care programs and early intervention in this population.

Correspondence: *Natalie Barre, Murdoch Childrens Research Institute, Flemington Road, Parkville, VIC 3052, Australia. E-mail: ngbarre@hotmail.com*

#### **A.T. MORGAN, L. PIGDON, A. CONNELLY & F. LIEGEOIS. Chronic Dysarthria following Paediatric Traumatic Brain Injury: Neural Correlates.**

**Objective:** Dysarthria is a debilitating speech disorder that disrupts the human need to communicate. Around 2000 Australian children are affected by dysarthria each year following traumatic brain injury (TBI). Little is known about prognostic factors for dysarthria following TBI. This study aimed to examine neural correlates for persistent ( $>1$  year post-injury) dysarthria in children after TBI. It was hypothesized that children with dysarthria would have bilateral disruption to key motor-related white matter tracts, precluding their ability to recover speech motor function.

**Participants and Methods:** MRI data were acquired on 33 participants (11 TBI + dysarthria, 11 TBI - dysarthria, 11 healthy controls), matched for age and sex across groups. Group differences in white matter (WM) density were examined using voxel-based morphometry (VBM) in Statistical Parametric Mapping (SPM8), conducted on high-resolution 3D T1-weighted whole brain datasets (voxel size  $\sim 0.7$  mm<sup>3</sup>). Global WM, grey matter (GM) and cerebrospinal fluid (CSF) volumes were measured using the Easyvolume tool implemented in SPM8.

**Results:** No differences were noted between groups in relation to GM or CSF. The TBI + dysarthria group had reduced WM volume relative to the healthy control group. VBM analyses demonstrated that the TBI + dysarthria group had reduced white matter density bilaterally compared to healthy controls in regions including the posterior limb of the internal capsule (PLIC) and the corona radiata ( $p < 0.005$ ). Compared to the TBI - dysarthria group, reduced white matter density was found in the right PLIC ( $p < 0.005$ ).

**Conclusions:** For the first time in a population with acquired brain injury, preliminary data indicate that persistent dysarthria may be associated with bilateral abnormalities along the corticospinal tract. This hypothesis corroborates data from developmental (e.g., inherited) paediatric populations, where bilateral disruption to speech motor regions seems required to result in long-lasting persistent dysarthria.

Correspondence: *Angela T. Morgan, PhD, Murdoch Childrens Research Institute, 50 Flemington Road, Parkville, Melbourne, VIC 3052, Australia. E-mail: angela.morgan@mcri.edu.au*

#### **U. EMBULDENIYA, L. GONZALEZ, S. HARVEY, J. WRENNALL, A. WOOD & R. TESTA. Symptomatic Focal Epilepsy in Childhood: The Cognitive Effects of Seizure Onset During a Critical Developmental Period.**

**Objective:** Knowledge of age-related effects of seizures on cognition in childhood is sparse compared to other paediatric brain insults (e.g TBI). As such, the aims of this research were to clarify the effects of epilepsy on specific cognitive skills, and in particular, to understand the effects of timing of seizures during early childhood.

**Participants and Methods:** Cognitive abilities of children with symptomatic focal epilepsy (SFE;  $N=35$ ) recruited from the Royal Children's Hospital (Melbourne) were assessed. For onset group comparisons, chil-

dren with onset between 3-5 years (early onset; EO;  $N=18$ ) were compared to those with onset between 6-8 years (late onset; LO;  $N=8$ ). Onset groups were matched for seizure variables except age at onset. Language, attention, memory and visuospatial skills were studied. Given that research has lacked consideration of age-specific effects within a developmental paradigm, hypotheses were framed according to Dennis' (1989) heuristic (i.e skills emerging at the time of insult are most vulnerable to damage).

**Results:** Children with SFE demonstrated statistically significant widespread deficits relative to normative data. Those with secondarily generalised seizures, on polytherapy and from families with lower socioeconomic status, were more likely to have poorer cognition. In regard to timing of seizures, the EO group performed more poorly relative to both the LO group and norms, especially for skills that were being acquired at time of seizure onset. Visuospatial skills appear principally vulnerable.

**Conclusions:** Cognitive skills emerging at the time of seizure onset were most vulnerable. This argues for the role of development in mitigating outcome in SFE children, with evidence that earlier age at seizure onset (i.e. during preschool period) is associated with greater cognitive burden than later-onset SFE. These findings hold important clinical implications including consideration of timing of early interventions such as surgery to halt seizures as soon as possible.

Correspondence: *Upeka Embuldeniya, Doctorate of Clinical Neuropsychology, 2/660 Springvale Road, Mulgrave, Melbourne, VIC 3170, Australia. E-mail: upeka.embuldeniya@monash.edu*

#### **E.L. GOULD, M.J. HARRISON & M.D. FOSTER-OWENS. Working Memory, Attention, Academic Achievement and School Reports in Typically Developing Primary School Children.**

**Objective:** Attention and working memory (WM) deficits have been linked to academic underachievement in children. While previous studies have examined the link between these cognitive factors and academic achievement within clinical populations, their impact in typically developing children and their impact on teacher's estimates of school achievement is not well understood. The current study examined the relationship between WM, attention, academic achievement and teacher judged school performance in a non-clinical sample. It was hypothesised that academic performance, rated on school reports, would be consistent with formally measured academic achievement and that teacher's reports would correlate with WM and attention.

**Participants and Methods:** Participants were 33 females and 27 males, aged 8 to 12 years, recruited from four public primary schools and individually administered subtests from the Wide Range Achievement Test (WRAT-4), the Working Memory Test Battery for Children (WMTB-C), the Test of Everyday Attention for Children (TEA-Ch) and Raven's Coloured Progressive Matrices (RCPM).

**Results:** Teacher's ratings of academic abilities on school reports were highly consistent with formal measures of academic achievement. Partial correlations, controlling for intelligence, revealed that teacher's judgements of academic performance were significantly correlated with formal measures of central executive WM functioning. Regression analyses revealed that only selective attention, and not divided or switching attention, was significantly related to children's mean school report scores after controlling for intelligence.

**Conclusions:** Findings support the validity of teacher's to accurately assess children's academic progress, as well as the possible utility of teacher's assessments of academic abilities in detecting differences in WM and selective attention.

Correspondence: *Emma L. Gould, BBS (Hons), Psychology, Deakin University, Level 3, 27 Brougham Street, Geelong, VIC 3217, Australia. E-mail: emma.gould@deakin.edu.au*

### **Session 19: Rehabilitation Models**

**10:30 a.m.–12:00 p.m.**

#### **C. HARRISON-FELIX. A Comparison of Databases for TBI: New Zealand and the United States.**

**Objective:** The United States TBI Model Systems and the New Zealand Integrated Rehabilitation Services – TBI are treating similar patients



and collecting similar data. Comparisons will be presented for a cohort of individuals in both databases who have received inpatient rehabilitation for TBI between 2008 and 2010 (common years of data collection), who were at least 16 years of age at the time of injury. Variables in common between these two databases are age, gender, race, employment/productive activity status prior to TBI, cause of TBI, blood alcohol level at hospital admission, Glasgow Coma Scale score at hospital admission, duration of post traumatic amnesia, Functional Independence (FIM) at rehabilitation admission and discharge, length of acute and rehabilitation hospitalizations, residence after rehabilitation discharge, and productivity/status at approximately 1 year post TBI. These similar variables have allowed us to compare these two populations in terms of demographic and socioeconomic characteristics, mechanisms and severity of TBI, functional status and status/outcomes after hospitalization.

Correspondence: *Cynthia Harrison-Felix, Craig Hospital, 3425 South Clarkson Street, Englewood, CO 80113. E-mail: charrison-felix@craighospital.org*

**K. HOPMAN, R. TATE & A. MCCLUSKEY. Community-based Rehabilitation: A Comparison of Intervention Profiles and Clinical Outcomes From Two Program Models.**

**Objective:** Community-based rehabilitation programs for people with traumatic brain injury (TBI) are diverse. Comparative program evaluation is required to identify optimal type, intensity and duration of programs. This study compares the effectiveness of two types of community-based TBI rehabilitation programs.

**Participants and Methods:** The study employed a quantitative, multi-centre, longitudinal design. Persons with severe TBI (N=41) were recruited from two residential, transitional living programs (TLU; n=21) and two home-based community rehabilitation programs (CR; n=20). Participants were assessed via interview at program entry, 2 months and 6 months using a broad range of standardised measures. The quantity and types of intervention provided to study participants were recorded.

**Results:** No significant differences between the TLU and CR groups at baseline were identified. TLU and CR participants made significant improvements in their activity and participation levels compared to baseline. There were no statistically significant between-group differences at 6 month follow-up. Two significant group-by-time interactions were identified on the CIQ. The CR group had significantly greater changes in productivity ( $p=0.003$ ;  $d=1.0$ ) compared to the TLU group over time while the TLU group showed significantly greater improvements in social integration ( $p=0.007$ ;  $d=0.86$ ). TLU participants received up to five times more intervention than the CR participants.

**Conclusions:** Only two between-group differences were identified for TLU and CR groups. This is important considering the substantial difference in quantity of intervention provided to TLU and CR participants. Further examination of TLU and CR participant contextual factors and impairments is required for future program evaluation.

Correspondence: *Katherine Hopman, BAppSC (Occupational Therapy Hons.) MScMed, Brain Injury Rehabilitation Unit, Liverpool Hospital, Locked Bag 7103, Liverpool Brain Injury Rehabilitation Unit, Liverpool BC, NSW 1571, Australia. E-mail: katehopman@optusnet.com.au*

**G. TA'ED, C.E. SKILBECK & M. SLAYTER. Factors Determining the Nature of Community-based Rehabilitation Services Following Traumatic Brain Injury (TBI).**

**Objective:** To identify factors determining referral to clinical disciplines, in a community rehabilitation setting, following TBI.

**Participants and Methods:** The Community Rehabilitation Unit (CRU) is the single point of referral for adults requiring public outpatient rehabilitation services in Tasmania. Chi-square analyses were used to examine demographic, clinical, psychological and physical variables for 175 TBI patients referred to CRU, to see which factors were related to referral to its clinical disciplines.

**Results:** Increased service use, as measured by the number of disciplines referred to, was associated with longer post-traumatic amnesia (PTA) ( $p=.035$ ), previous TBI ( $p=.025$ ) and functional dependence ( $p=.018$ ). Nursing and psychology received the largest number of referrals. Referral to physiotherapy was associated with older age ( $p=.009$ ), hospitalization ( $p=.009$ ), longer PTA ( $p=.003$ ) and higher estimated pre-morbid IQ ( $p=.001$ ). Referral to occupational therapy was associated

with older age ( $p=.043$ ), longer PTA ( $p<.001$ ), hospitalization ( $p=.013$ ) falls ( $p=.045$ ), and functional dependence ( $p=.011$ ). Referral to psychology was associated with assault-related TBI ( $p=.012$ ), and referral to social work with depression ( $p=.025$ ) and lower education ( $p=.035$ ). Nursing offered more appointments to women ( $p=.008$ ) and to those with previous TBI ( $p=.049$ ).

**Conclusions:** In this study, less traditional rehabilitation services, such as psychology, received more referrals than traditional disciplines, such as physiotherapy. Older age, functional dependence, hospitalization and TBI severity were stronger predictors of service use, and of referral to traditional rehabilitation disciplines, than measures of post-concussion symptoms or psychological distress. The findings strengthen the case for ensuring that psychology is seen as a core rehabilitation discipline. Correspondence: *Gill Ta'eed, Master of Psychology, Psychology, University of Tasmania, 2 Alex Court, Kingston Beach, TAS 7050, Australia. E-mail: gtaeed@gmail.com*

**G. COUCHMAN, J. PONSFORD, A. KELLY & G. MCMAHON. Headstart: creating social spaces for recovery from brain injury.**

**Objective:** The Headstart program utilises a multi-family group (MFG) model to enhance the recovery of people with traumatic brain injury. This model has been shown to be effective in improving outcomes for individuals with mental illness (McFarlane 2003). Headstart builds on previous randomised-control trials of the MFG model for both Depression and Psychotic illness (Bradley, Couchman et al. 2005) and provides an opportunity to determine the efficacy of MFG in a traumatic brain injury sample, and compare and contrast the findings in various health contexts.

**Participants and Methods:** The Headstart wait-list control trial involves 44 brain injured people and their families. Quantitative measures included social integration, mental health and TBI behaviour and recovery, and the data was processed using analysis of variance. Grounded theory methodology was used to analyse the qualitative data collected from each group of participants at the completion of their treatment component.

**Results:** The quantitative data pointed to differing perceptions of non-brain-injured and brain-injured family members, as well as the MFG's impact on anxiety. Qualitative data of group involvement described family changes in the perceptions of normality, reality and self identity, as well as the management of these within the MFG. They also revealed the challenges of emotional sharing for all family members, and the essential dilemma for injured individuals in conveying their new world experience to others in the context of cognitive impairment.

**Conclusions:** The Headstart study provides a unique opportunity for a quantitative and qualitative understanding of the MFG process for people with brain injury and their families. While the MFG elicits similar processes for people with TBI as for people in other health domains, unique components, such as the integration of trauma and the conceptualisation of cognitive impairments was evident.

Correspondence: *Grace Couchman, D psychology, 184 weston st, East Brunswick, Melbourne, VIC 3057, Australia. E-mail: grace.couchman@monash.edu*

**L. SHANAHAN, L. MCALLISTER & M. CURTIN. Ripe for Rehab: A Contextualised Approach to Effectively Engaging Adolescents With TBI in Cognitive Rehabilitation.**

**Objective:** The past decade has seen an increased use of contextualised practice in paediatric traumatic brain injury (TBI) rehabilitation with a body of literature supporting the effectiveness of such approaches (Ylvisaker & Feeney, 2009). However, as the demands of normal adolescent development emerge, engaging adolescents in long-term rehabilitation can prove to be challenging. This paper presents the 'Ripe for Rehab' framework; a framework for engaging adolescents in cognitive rehabilitation that is considerate of their developmental needs.

**Participants and Methods:** Two adolescent males with childhood acquired TBI and their mothers, participated in a mixed methods study that explored perceptions of executive functioning skills. Standardised assessment and semi-structured interviews were used to collect data. Qualitative data was analysed using IPA.

**Results:** This framework captures the key components needed to promote a positive perception of executive functioning skills in adolescents with TBI, namely, positive relationships, relevant activities and self-development. It is underpinned by findings from the study, which found

that executive functioning development is positively influenced by the supportive relationships adolescents develop with naturally occurring mentors. Environments that offer meaningful activity and opportunities for autonomous behaviour also contribute to creating and maintaining a positive perception of executive functioning skills. Such contextual factors were found to increase adolescents' motivation and engagement. These findings were synthesised with Vygotsky's theory of learning and cognition, the contextualised rehabilitation framework (Ylvisaker & Feeney, 2009), the Social Development Model (Catalano & Hawkins, 1996) and Self-Determination Theory (Ryan & Deci, 2000) to form the Ripe for Rehab framework.

**Conclusions:** Although in the early stages of development, the Ripe for Rehab framework will provoke clinicians to consider the true use of contextualised intervention in their everyday practice.

Correspondence: *Lucie Shanahan, School of Community Health, Charles Sturt University, PO Box 789, Albury, NSW 2640, Australia. E-mail: lucie.shanahan@gsahs.health.nsw.gov.au*

### **C.Y. DURHAM, P. RAMCHARAN & J. LANG. Fostering Insight and Understanding of the Social Challenges of Brain Injury.**

**Objective:** This qualitative research examines how educational principles of engagement, motivation, and different ways of learning/understanding could be employed to encourage people with brain injury to reflect, and identify phenomena in their 'lifeworld', that help them feel and fare better. A new tool was developed and trialled to examine brain injury from the 'subject-body', 'insider's' perspective. Note the researcher has brain injury.

**Participants and Methods:** The innovative 'Keys to the Brain Injury Cage' was used and involved 33 people with brain injury. It used a metaphor/tool and talk-about cards to guide 20 participants in a guided conversation/interview. 10 had previously completed sheets after viewing an accompanying CD. 13 completed the CD and sheets only. 5 carers and 5 professionals were also interviewed. Transcripts were analyzed using Interpretative Phenomenological Analysis.

**Results:** Intentionality, models, philosophies and belief systems define how people with brain injury are viewed and treated. Completed data analysis identified that people with brain injury also have their own philosophies and belief systems through which they view themselves and how they are treated. The social aspects from loss of ability and status, shame, guilt and isolation can negatively affect their well-being. However, analysis also revealed issues around power, truth, fairness, and justice had profound long term ramifications on the way they felt and fared.

**Conclusions:** 'Keys to the Brain Injury Cage' engaged and empowered people with brain injury to reflect and gain insight and understanding of how they met and could meet their challenges. This tool could be used by individuals, their families and professionals to foster insight, understanding and encourage the individual to play an active role in their process of learning to live with brain injury. The research methodology therefore also has practice-based applications in considering needs in context.

Correspondence: *Christine Y. Durham, M.Ed, Health Sciences, RMIT University, 28 Porter Street, Eltham, VIC 3095, Australia. E-mail: christine.durham@student.rmit.edu.au*

## **Session 20: Treatments and Interventions**

**10:30 a.m.–12:00 p.m.**

### **S. BACKHAUS, S. IBARRA, D. PARROTT, K. CAPP & J. MALEC. Examination of a Cognitive-Behavioral Group Intervention to Improve Self-Efficacy and Neurobehavioral Functioning in Brain Injury Survivors and their Caregivers: What Factors Influence Improvement?**

**Objective:** Clinicians seek to understand which types of treatments are most beneficial for individuals with brain injuries (BI). The purpose of this study was to compare two groups (Manualized Cognitive-Behavior Treatment or CBT versus Self-Directed) on the effects of Perceived Self-Efficacy (PSE) and neurobehavioral functioning.

**Participants and Methods:** Thirty-eight individuals were recruited from an outpatient rehabilitation facility (19 with brain injury and their caregivers). Subjects were randomly assigned to groups who met for 16 weeks. PSE and neurobehavioral functioning were measured at baseline, immediately following intervention, as well as 3-month follow-up.

**Results:** ANCOVA showed significantly improved PSE for both groups with no significant difference between them at immediate post-treatment ( $F=2.24$ ;  $p=.143$ ). ANCOVAs also revealed a significant difference between the groups on disinhibition ( $F=5.34$ ;  $p=.035$ ), and a trend for apathy at immediate post-treatment ( $t=1.80$ ;  $p=.097$ ), with the CBT group showing more improvement.

**Conclusions:** This study showed that both types of treatment can improve PSE, but that only CBT results in significant reductions in disinhibited behaviors such as irritability, anger, emotional lability, and impulsivity. Specifically, in the Self-Directed group, individuals overtly voiced motivation to improve, utilized a Menu of Topics to review from, and independently presented research on these topics on a weekly basis (something not expected from the usual 'support group'). Implications of when and for what purpose CBT treatment is used will be discussed, as this study showed that one therapy did not 'fit all' as some clinicians have assumed when using CBT. Perhaps, "social competition or rivalry" may greatly influence self-efficacy. Yalom's Universality theory may also contribute to improvements. In contrast, only CBT helped improved neurobehavioral challenges which affect the family. Implications will be discussed.

Correspondence: *Samantha Backhaus, 6585 Westminster Drive, Zionsville, IN 46077. E-mail: samantha.backhaus@rhin.com*

### **T. TSAOUSIDES. Integrating Problem Solving and Emotional Regulation Skills in a Day Treatment Program for Individuals with Traumatic Brain Injury.**

**Objective:** Impairments in executive functioning are common following traumatic brain injury (TBI) and are often related to impaired problem solving (PS). In turn, poor emotional regulation (ER) interferes with effective PS. The purpose of this study was to compare a standard day treatment program (SDT) to Executive Plus (EP), a day treatment program focused on improving executive functioning by integrating PS and ER skills. ER is a cognitive-behavioral intervention designed to increase awareness of the nature and impact of emotional reactions on cognition and behavior and to promote skill development to improve emotional control and appropriate behavioral responses. Case studies are used to illustrate the implementation and skill development of PS and ER.

**Participants and Methods:** Fifty-two individuals were randomly assigned to either to EP (27) or to SDT (25). Thirty-eight completed treatment and 32 completed the 6-month follow-up assessment. Outcome measures included several objective and subjective measures of attention, executive functioning, self-efficacy, mood, and quality of life.

**Results:** Within subject and single-subject repeated measures analyses revealed significant improvement in outcome for both groups at the end of treatment. However, larger effect sizes were observed for the EP group at the 6-month follow-up assessment in terms of attention, executive functioning, mood, and quality of life.

**Conclusions:** The results of the study show that by embedding a combination of PS and ER interventions in a day treatment, the positive effects are prolonged beyond the duration of treatment. Given the negative impact of emotional dysregulation on problem-solving, combining the two interventions appears to lead to improved problem-solving and decision-making, improved interpersonal communication and relationships, and improved mood.

Correspondence: *Theodore Tsaousides, One Gustave L. Lery Place, New York, NY 10029. E-mail: theodore.tsaousides@mountsinai.org*

### **M. HSIEH, J. PONSFORD, D. WONG & M. SCHONBERGER. Motivational interviewing and cognitive behavior therapy for anxiety following traumatic brain injury: A pilot randomized controlled trial.**

**Objective:** Although cognitive-behavior therapy (CBT) is the treatment of choice for anxiety disorders in the general clinical population, its delivery needs to be adapted to accommodate the characteristics of indi-

viduals with moderate-severe TBI. It also requires active engagement from the participant for maximum benefit. In this study, we developed an anxiety treatment program adapted for people with TBI, based on CBT and motivational interviewing (MI). We compared the effectiveness of three treatment conditions: non-directive counseling (NDC)+CBT, MI+CBT, and treatment-as-usual (TAU), in a pilot randomized controlled trial.

**Participants and Methods:** This study was conducted between May 2008 and October 2010, with a community-based sample of patients from an acquired brain injury specialist rehabilitation hospital. Twenty-seven participants with moderate/severe TBI (aged 21 – 73 years, 78% males) were randomly allocated to receive MI+CBT (n=9), NDC+CBT (n=10) and TAU (n=8). CBT and MI were manualized and delivered in 12 weekly individual sessions. Primary outcome was self-reported anxiety symptoms. Assessment was conducted independently of the treating psychologist, and the assessors were blinded to group assignment.

**Results:** Intention-to-treat analyses showed that the two active treatment groups demonstrated significantly greater reduction in anxiety than the control group. In addition, participants receiving the MI pre-treatment showed greater response to CBT, in terms of reduction in anxiety, stress and non-productive coping, compared to participants who received non-directive counseling.

**Conclusions:** The positive treatment outcomes provided preliminary support for the effectiveness of the CBT program adapted for individuals with moderate-severe TBI, and the potential utility of MI as a prelude to CBT.

Correspondence: *Ming-Yun Hsieh, Wellington Road, Clayton, VIC 3800, Australia. E-mail: ming-yun.hsieh@monash.edu*

#### **F. SUH, B. COWARD, F. BARZI, K. WALDIE & A. MORROW. Systematic Review of Non-Pharmacological Interventions for Attention Deficit: A Meta-Analysis.**

**Objective:** Attention deficit is a frequent complication of many neurological and psychiatric conditions including acquired brain injury, schizophrenia and attention deficit hyperactivity disorder. It can have a negative impact on social, educational and vocational outcomes. Despite a growing interest in the role of cognitive remediation for attention deficit, its efficacy remains uncertain. The aim of this systematic review was to conduct a meta-analysis of non-pharmacological interventions for remediation of attention deficits.

**Participants and Methods:** MEDLINE, PsycINFO, EMBASE and Cochrane CENTRAL databases were searched from 1995 to December 2010 with English language restriction. Key terms included attention, combined with cognitive or neuropsychological rehabilitation/intervention/treatment/remediation/therapy. Two independent reviewers screened reports to identify randomised-control trials of non-pharmacological interventions for the remediation of documented attention deficit. Studies which conducted outcome assessment with a validated measure of attention were included. Meta-analysis was conducted using standardised mean difference.

**Results:** The initial search yielded 4707 articles, 48 of these met our inclusion criteria. We describe the study characteristics, including sample size, patient population, type of attention targeted, study duration and type of intervention. We categorized studies by population and intervention type for sub-group analyses. Non-pharmacological interventions were categorised as cognitive, behavioural, musical, and computer based. Included studies represent the heterogeneous aetiology of attention deficit. We report the preliminary findings of our meta-analysis.

**Conclusions:** This is the first comprehensive systematic review summarising the efficacy of attention remediation across all populations and non-pharmacological intervention types. This study will help guide clinical practice and future research in this important area.

Correspondence: *Flora MinSun Suh, Rehabilitation, The Children's Hospital at Westmead, 188 Luckens Road, West Harbour, Auckland 0618, New Zealand. E-mail: flora613@gmail.com*

#### **J. DOUGLAS, C. BRACY & P. SNOW. Return to Work and Communication following Severe Traumatic Brain Injury.**

**Objective:** Return to competitive employment is a major challenge for adults with severe traumatic brain injury (TBI) and relatively few do so successfully. This study was designed to compare the communication profiles of those who return to and maintain employment with those who are not able to do so.

**Participants and Methods:** 42 adults with severe TBI (posttraumatic amnesia > 14 days) participated in the study. Twenty-one had returned to work and twenty-one had not. A minimum of 2 years had elapsed since injury. The groups were gender-matched and did not differ with respect to injury severity ( $p = .15$ ), time postinjury ( $p = .06$ ), age at assessment ( $p = .24$ ) and education ( $p = .07$ ). Communication was measured using self-report and close other versions of the La Trobe Communication Questionnaire (LCQ). The LCQ has been shown to be a reliable and valid measure of communication outcome after TBI. Group comparisons on LCQ total scores were analysed using mixed (2 X 2) ANOVA (between factor: employment status; within factor: perception – self vs close other). Independent and paired t-tests were used to conduct planned comparisons.

**Results:** ANOVA revealed a significant group main effect ( $p < .01$ ) and a significant interaction ( $p < .01$ ). Employment was consistent with significantly fewer communication difficulties (self and close other report) and concordance between self and close other reports. Further, a subset of communication behaviours emerged as being particularly in the workplace.

**Conclusions:** Both communication outcome and awareness of communication deficits differentiate those who return to work successfully from those who do not following severe TBI. Not only the number, but also the nature of communication deficits plays an important role in successful reintegration to the workplace after brain injury.

Correspondence: *Jacinta Douglas, PhD, Human Communication Sciences, La Trobe University, Kingsbury Drive, Bundoora, VIC 3086, Australia. E-mail: J.Douglas@latrobe.edu.au*

#### **A. JANSARI, C. FOGG, R. SUKTHANKAR & J. MICHAEL. Saving Face: Assessing Rehabilitative Training Procedures in Acquired and Developmental Prosopagnosia.**

**Objective:** Individuals with acquired and developmental prosopagnosia have profound difficulty recognising familiar faces. To date, few studies have reported significant rehabilitation gains in treating such impairments. Employing predictions derived from face-space theory (e.g. Valentine, 1881) and suggestions of preserved featural-processing (e.g. Moscovitch et al. 1997) in prosopagnosia, this comparative study attempted rehabilitation in such patients.

**Participants and Methods:** A case series design compared the performance of four people with prosopagnosia (three with the acquired form and one with developmental prosopagnosia) against that of six matched normal controls. Three conditions were employed: 1) Part-recognition focussed the attention on distinctive individual features; 2) Caricaturing artificially exaggerated aspects of target faces; 3) Simple Exposure acted as a control. Training entailed six learning trials on a different set of 10 previously unseen faces for each condition. Memory was tested after the third and sixth learning trials.

**Results:** Using  $d'$  discrimination scores, results showed that the patient with the purest form of acquired prosopagnosia benefitted most from the rehabilitation regimes while the individual with developmental prosopagnosia received the second highest gains. However, interestingly, there was no simple dichotomy in terms of aetiology and rehabilitation regime.

**Conclusions:** The findings suggest that it is possible to have gains in face-recognition abilities. But they also suggest that rehabilitation of those with prosopagnosia must be nuanced rather than sharply dichotomised, taking into account not only whether they were born with the impairment versus whether they acquired it, but also individual variations and any self-developed compensatory strategies.

Correspondence: *Ashok Jansari, School of Psychology, University of East London, Water Lane, London E15 4LZ, United Kingdom. E-mail: a.jansari@uel.ac.uk*